

# THE IRON AGE

Established  
1855

New York, June 9, 1910

VOL. 85: No. 23

Published Every Thursday by the  
**DAVID WILLIAMS COMPANY**  
14-16 Park Place, New York

Entered at the New York Post Office, as Second Class Mail Matter.

Subscription Price, United States and Mexico, \$5.00 per Annum; to Canada,  
\$7.50 per Annum; to Other Foreign Countries, \$10.00 per Annum.  
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## No Railroad Cancellations

### Basic Iron More Active and Lower

### Pig Iron Curtailment Only About 10 Per Cent. from the Record Rate of February

Out of the confusion into which the iron market was thrown by the action of the Government against the Western railroads there is already this certainty—that no equipment contracts have been canceled or held up. There is on all hands the disposition to take a hopeful view of the outcome, and because of this as well as the actual buying of the week in both pig iron and finished lines, the tone of the market has improved. While the emergence from fear and uncertainty is welcome its rapidity has been somewhat bewildering.

Curtailment of pig iron output in May did not bear out the expectations of some in the trade that a decisive restrictive movement would promptly bring production to the level of consumption or below. Whereas, there was a net reduction of 25 in the number of active furnaces in April, last month showed a loss of but 10. The rate of production in May was 77,102 tons a day, against 82,792 tons a day in April. The capacity active June 1 was 76,846 tons a day, or 28,450,000 tons a year, estimating charcoal iron. This represents the cutting off of but 10 per cent. from the high rate of February, which was 31,650,000 tons a year.

It would seem that the blowing out of furnaces has not yet gone far enough, as pig iron stocks increased in May, and in both steel making and foundry grades are growing unwieldy. The Steel Corporation's idle furnaces now number 29, two having blown in this month—one Caine and one Gary.

Sales of pig iron have been largest in Central and Western markets and basic iron has shown marked weakness. A steel foundry interest at Chicago bought 15,000 tons of Southern basic; at St. Louis a steel foundry contracted for 10,000 tons, and at Pittsburgh the leading maker of steel castings took 15,000 tons at a low price. A Shenango Valley steel foundry has closed with a valley furnace on a sliding scale basis for its requirements of Bessemer and basic pig iron in the last half of the year at the rate of 2500 tons a month. Bessemer pig iron has sold in an unimportant way at \$15.75, at Valley furnace, while basic iron is now \$14.75.

In foundry iron sales have been less than in the preceding week. Makers of Northern iron have apparently been more ready to grant concessions, sales in Ohio having been made at \$14.50 at Mahoning Valley furnace for No. 2 and at \$15, Iron-ton. In northern Ohio and in Michigan foundry inquiry is increasing and at the attractive prices recently named considerable business has been done. A number of malleable and gray iron foundries in the Central West and the Chicago district, which have sold a portion of their output for the second half, are now in the market for pig iron.

Southern sellers of foundry iron are taking a firmer stand in some districts, and \$11.50 is not so

generally available for the entire second half of the year.

A number of coke contracts are under negotiation, following the recent deal by a western Pennsylvania steel company for 15,000 tons a month over a period of three years. At Cleveland a furnace interest has closed for 50,000 tons of coke for the second half and is in the market for 100,000 tons more. The recent consolidation of four Connellsville producers has resulted in a firmer market. A good many contracts for foundry coke are now being made for the third and fourth quarters.

Attention has been directed to a sale of 3000 tons of Bessemer billets in eastern Ohio at \$26, delivered, or equivalent to less than \$25, Pittsburgh, though the steel comes from another district.

The prospect for rolling mill operations in the summer months is being carefully canvassed in view of the expiration of many contracts with the end of June. Finishing capacity in a number of lines is not fully employed and the shading of prices is a symptom which will have closer attention as the summer advances.

Structural steel contracts of the week include 5000 tons for the new plant of the Pittsburgh Plate Glass Company, Ford City, Pa., and 2500 tons each for the General Electric Company's foundry at Erie, Pa., and the new smelter of the Chino Copper Company. Bridge work pending amounts to about 25,000 tons, including 15,000 tons for the new Louisville bridge over the Ohio River.

Rail buying is light, apart from one order for 19,000 tons of open hearth rails placed at Chicago. In the same district sales of 5000 tons additional of open hearth and 4000 tons of Bessemer rails were made last week.

Buying of pipe for a Western gas line amounts to 6000 tons, and a western Pennsylvania gas company will buy 37 miles of 10-in. pipe.

The disagreement between the committees of the Amalgamated Association and the Western Bar Iron Association at Detroit last week will not force the shutting down of mills July 1, as an arrangement exists for continuous operation pending the adjustment of wage scales. Conferences are now being arranged between the Amalgamated Association and the Republic Iron & Steel Company on bars and with various independent sheet and tin plate mills.

### Labor Unions and Employees' Benefits

It is very evident that the moves recently made by important industrial corporations in the interest of their employees are not approved by certain labor union leaders. Higher wages, accident benefits and old age pensions would naturally be considered desirable from a trade union standpoint. But the trouble seems to be that in the cases referred to these larger rewards to labor were not secured through labor organizations. They were announced, in fact, by companies whose plants are not operated under agreements with unions; they therefore challenge the common claim of unionism that it has wrung from unwilling employers all that industrial workers have gained in the past generation. One trade union publication, finding nothing to complain of in these accident benefit and old age pension programmes themselves, makes the damning charge that they were inspired by selfish motives. Supposing the accusation to be true, we shall not expect to see any organized refusal of the proffered benefits; just as we should not look for the refusal of a wage advance granted the members of a union, even

though they might suspect that the employer yielded to avoid the loss a strike would inflict, rather than from purely altruistic motives.

We have, indeed, a new application of the old saying: "Beware, the Greeks bearing gifts," when employees are asked to be suspicious of employers making voluntary advances in wages and introducing accident compensation systems and pensions. Yet some of these malevolent comments on the betterment measures that are becoming more common, on the employers' initiative, are only the legitimate fruit of what labor agitators have constantly preached, of the essential antagonism of employer and workman. It is just as plain, however, that employers have done some very effective work in the past few years in antidoting that poison.

### Rotary Engines

Rotary engines have promised so much and delivered so little that naturally faith has been lost in their value. Very many engines of this type have been invented, but few have gone beyond that stage. Even those that have been built and operated were soon lost sight of, and the inference must be that they finally proved impractical. Under such circumstances an inventor of a really meritorious article of this kind must resort to unusual means to gain a hearing and secure serious attention from the engineering world. Realizing this, the Herrick Engine Company conceived the idea of announcing the invention of its rotary engine to a number of prominent guests at a dinner held in celebration of the inventor's achievement. An account of this dinner appeared in *The Iron Age* May 26, 1910, and an illustrated description of the engine in last week's issue.

Attention is called to this for the reason that if a successful rotary engine has at last made its appearance it is an event of no little importance. Experience has taught caution in being too hasty to pronounce a rotary engine a success; hence the qualification in the preceding statement. A considerable number have already been disillusioned of their credulity over some rotary engine proposition. In the present instance the suspicion of a stock jobbing scheme is removed because the company has been formed to exploit this engine and no stock is for sale. This in itself is reassuring, but even with the satisfactory economy and durability trials that have been made, and the opinions of experts convinced of its practicability, there are still too many chances of surprise to declare unequivocally that the successful rotary engine has come. True, a most important new principle has been discovered, that of balancing unequal lateral thrusts on the rotor shaft of any rotary engine having but a single blade, and other defects that have meant the failure of previous designs appear to have been overcome, but what new difficulties may develop when it is attempted to construct the engine in large sizes and to apply it to specific work remain to be seen.

Still it is interesting to ponder over some of the possibilities that lie ahead of the really practical rotary engine. That it will displace any of the present types of prime movers is exceedingly unlikely. It was predicted that the steam turbine would supersede the steam engine, and that the gas engine would replace them both, but our knowledge of the three has reached the point where it is evident that none of these pre-



dictions will be fulfilled. Each engine has its place and will gradually establish for itself the definite limits within which it is the most eminently suitable type, and the same may safely be assumed for the rotary engine. Probably it will occupy a position between that of the reciprocating engine and steam turbine. It may be even found possible to operate it on the internal combustion principle of the gas engine, in which case it may become an ally of the latter as well. In any event it will start with one certain advantage which the steam turbine alone enjoys to-day, that of applying the power in the most direct manner in rotary motion. It will also have the turbine's ability to use steam at high superheat, at least such is claimed in the Herrick form, and it promises ability to operate economically under high pressure, a respect in which the reciprocating engine has the advantage of the turbine.

The article last week deals with one attractive prospect, that of co-operation between the rotary engine and steam turbine by operating the two in series where each enjoys the pressure and temperature ranges in which it is most efficient. The prophecy of the advance that such an application may mean in marine work is extremely interesting, for if there is one place more than another where a better power plant is sought, it is on shipboard, as evidenced by the present wide diversity in designs of this class of plant. On shore the problems are different. Weight of equipment and space occupied are considerations that are subservient to the highest economical performance, but in the latter direction also there is hope in the roto-turbo combination, and we may be approaching a new era in stationary practice.

Equally full of opportunity and more immediately in sight are the applications of smaller sizes of rotary engines, as for the driving of auxiliary power plant equipment, portable contractors' machinery, and possibly also in transportation, for the haulage of trains or the propulsion of vehicles and various other kinds of moving machinery. The limits of the field are beyond our vision, but it is idle to continue in profitless conjecture. For every pioneer inventor there are hundreds equally clever to perfect his work, discover its uses and adapt it to them, and when these recognize the existence of a rotary engine that is right in principle they will take care of the development of its applications.

### The Railroad Freight Rate Suit

The business interests of the country are to be congratulated on the fact that they are not confronted with a long period of suspense, waiting for the decision in the suit instituted by the Attorney-General of the United States against the Western Trunk Line Committee and the railroads holding membership in that committee. At a conference between Western railroad officials and President Taft, held in Washington June 6, the railroad representatives agreed to make no increases of freight rates at present and to make no attempt to increase rates until the pending railroad bill, which confers on the Interstate Commerce Commission power to suspend proposed new rates for a total period of 10 months pending their examination and approval by the commission, has become a law. To accomplish this, the railroad representatives agreed to withdraw at once the tariffs filed

with the commission covering the increases that were enjoined in the suit against the Western Trunk Line Committee and its members and all other increases intended to be effective June 1 or later. On the part of the Government it was agreed that the injunction proceedings should be withdrawn, as well as the suit for the dissolution of the Western Trunk Line Committee as a combination in violation of the Sherman anti-trust law. The statement is made that the Administration thus trades a possible case under the Sherman law for the immediate certainty that there will be no increase in freight rates in the Western Trunk Line territory until the Interstate Commerce Commission has had opportunity to investigate and pass on the proposed rates.

More has, perhaps, been averted than simply the advance in freight rates. It is likely that the shippers who are credited with having instigated the attack of the Government on the Western railroads might have found far more important results than they anticipated. If the suit had been successfully prosecuted; if the several railroad companies had been adjudged guilty of violating the Sherman anti-trust law, and if their association had been ordered to dissolve, each company would presumably have acted independently thereafter. It would, of course, have been presumptive evidence of a secret, and therefore illegal, understanding if a shipper should find two or three railroads quoting the same freight rate to the same destination. But if it were otherwise a shipper would then be uncertain whether his competitor was not getting a lower rate than himself. The railroads have gone through a long experience of severe competition with one another, and finally, by a process of measuring strength and testing resources, have arrived at a basis of approximate fairness in competing for traffic—approximate, for perfection is no more to be expected in railroad business than in any other branch of human endeavor. During the period of railroad conflicts some shippers were benefited and others were undoubtedly damaged. The disturbance of stability and uniformity in rates would have been the certain result if the suit of the Government had been prosecuted to a successful conclusion. It is to be hoped that out of this compromise which has just been effected a condition of affairs will be evolved which will be satisfactory to all the interests concerned.

### Rapid Progress of Heroult Electric Furnaces in Europe

A number of additional deals with important steel works are reported from the European headquarters of the Heroult electric furnace, details of which will be consummated at an early day. One of the contracts just closed is with the Rombacher Huettenwerke, Rombach, Germany. These extensive steel works employ about 6000 hands. The immediate installation of two Heroult electric furnaces has been provided for, to be followed with probably four more of 12 tons each. It is expected that the entire production of basic open hearth steel will be refined in Heroult furnaces.

The Heroult furnaces installed at the Deutscher Kaiser Stahlwerke, at Bruchhausen, Germany, said to be the largest steel works in Europe, recently commenced refining steel. They have since been operating continuously without a hitch, and the results obtained, both in quality of product and moderate cost of operation, are reported to be more than satisfactory.

## Pig Iron Production

### A Moderate Decrease in May

#### Active Capacity June 1 Is 1850 Tons a Day Less Than on May 1

Curtailment of pig iron production in May was considerably less than in April, so far as the blowing out of furnaces is concerned. The production of coke and anthracite iron last month was 2,390,180 gross tons, or 77,102 tons a day, against 2,483,763 tons in April, or 82,792 tons a day. A good many furnaces blew out in the latter part of April, so that the effect of their stopping was not marked until last month. The capacity of the 279 furnaces active June 1 was 76,846 tons a day, while that of the 289 furnaces active May 1 was 78,693 tons a day, a reduction of 1850 tons a day, whereas the reduction between April 1 and May 1 was nearly 6000 tons a day. While there was a net loss of 25 in active furnaces in April, the net falling off in May was but 10. Two new furnaces blew in last month—that of Worth Brothers Company at Coatesville, Pa., and that of Corrigan, McKinney & Co. at Cleveland, Ohio.

The rate of production June 1, which was 76,846 tons of coke and anthracite iron, represents a yearly production of 28,450,000 tons, estimating charcoal iron at 400,000 tons a year. This shows a curtailment of a fraction more than 10 per cent. from the high rate in February, which was 31,650,000 tons a year. Such a reduction is a good deal short of the heroic measures heralded in some quarters.

#### Daily Rate of Production

The daily rate of production of coke and anthracite pig iron by months, beginning with May, 1909, is as follows:

Daily Rate of Pig Iron Production by Months.—Gross Tons.

	Steel Works.	Merchant.	Total.
May, 1909.....	40,531	20,222	60,753
June.....	45,507	19,149	64,656
July.....	48,670	19,123	67,793
August.....	51,354	21,192	72,546
September.....	55,361	24,146	79,507
October.....	57,067	26,789	83,856
November.....	56,333	28,584	84,917
December.....	57,058	27,964	85,022
January, 1910.....	57,200	26,948	84,148
February.....	57,876	27,740	85,616
March.....	56,113	28,346	84,459
April.....	55,663	27,129	82,792
May.....	52,235	24,867	77,102

#### Capacity in Blast June 1 and May 1

The following table shows the daily capacity of furnaces in blast June 1 and May 1. These figures are based largely on the performance of the furnaces in May and April:

Coke and Anthracite Furnaces in Blast.

Location of furnaces.	Total number of stacks.	June 1.		May 1.	
		Number in blast.	Capacity per week.	Number in blast.	Capacity per week.
New York:					
Buffalo.....16	14	4,956	14	4,748	
Other New York... 7	3	574	3	558	
New Jersey..... 8	3	642	5	970	
Spiegel..... 2	..	..	..	..	..
Pennsylvania:					
Lehigh Valley....23	14	2,095	14	2,085	
Spiegel..... 3	3	174	3	178	
Schuylkill Valley..16	9	2,023	9	1,742	
Low. Susquehanna. 7	5	1,090	5	1,167	
Lebanon Valley....10	7	956	9	1,190	
Pittsburgh dis....50	41	16,015	41	16,310	
Spiegel..... 3	3	464	3	418	
Shenango Valley...20	16	4,146	15	4,148	
West. Penn.....27	17	4,192	20	4,702	
Maryland..... 4	4	1,105	3	825	
Wheeling district...14	8	3,040	8	3,174	
Ohio:					
Mahoning Valley...22	19	6,940	20	7,519	
Cent. and Northern.22	14	4,940	13	4,833	
Hocking Val., Hanging Rock and S. W. Ohio.....15	10	1,345	12	1,608	
Illinois and Indiana.31	26	11,251	27	11,230	
Spiegel..... 3	3	314	2	147	
Mich., Wis. and Minn. 9	5	894	6	1,125	
Colo., Mo. and Wash. 7	5	1,311	5	1,335	
The South:					
Virginia.....23	12	1,395	12	1,340	
Kentucky..... 5	2	290	2	295	
Alabama.....46	23	5,384	24	5,650	
Tenn. and Georgia.20	13	1,310	13	1,396	
Totals.....413	279	76,846	289	78,693	

Among furnaces blown out in May or on June 1 are Andover and one Wharton in New Jersey, one Warwick in the Schuylkill Valley, one Bird Coleman and Edgewater in the Lebanon Valley, Edith in the Pittsburgh district, one Cambria, Emporium and Rebecca (banked) in western Pennsylvania, Mary and Niles in the Mahoning Valley, one Wellston in the Hanging Rock district, one Mayville in Wisconsin, one Bessemer in Alabama and one Rockwood in Tennessee.

The list of furnaces blown in in May or on June 1 includes the new Worth Brothers stack at Coatesville, Pa., Alice and Atlantic in the Shenango Valley, one Lucy in the Pittsburgh district, one Maryland at Sparrows Point, No. 2 Hubbard in the Mahoning Valley and the new furnace of Corrigan, McKinney & Co. in northern Ohio.

#### May Output by Districts

The table below gives the production of all coke and anthracite furnaces in May and the four months preceding:

Monthly Pig Iron Production.—Gross Tons.

	January. (31 days)	February. (28 days)	March. (31 days)	April. (30 days)	May. (31 days)
New York.....	172,260	159,470	180,005	166,307	171,461
New Jersey....	28,856	26,102	29,557	29,092	22,973
Lehigh Valley..	62,601	54,028	52,224	64,910	70,344
Schuylkill Val.	60,624	53,996	62,865	61,084	65,725
Lower Susquehanna and Lebanon Val.	69,413	64,054	70,738	71,694	65,667
Pittsburgh dis.	603,261	541,791	592,494	543,531	510,514
Shenango Val.	159,418	137,095	137,315	124,440	120,301
West. Penn....	141,495	133,266	143,308	141,246	144,578
Mich., Va. and Kentucky....	72,425	66,454	78,761	77,032	82,071
Wheeling dis.	124,553	120,036	113,753	106,736	94,217
Mahoning Val.	232,381	220,779	241,653	225,588	218,243
Central and North. Ohio.	217,681	201,462	218,660	181,805	144,344
Hocking Valley, Hanging Rock and S.W. Ohio	49,658	42,876	47,935	48,264	43,290
Mich., Minn., Mo., Wis., Colo....	70,989	65,363	77,209	75,802	71,588
Chicago dis....	333,892	322,196	348,972	351,272	358,509
Alabama.....	170,143	154,337	180,836	173,071	165,937
Tenn., Georgia and Texas....	38,952	36,949	41,664	41,889	40,418
Totals.....	2,608,605	2,397,254	2,917,949	2,483,763	2,390,180

#### The Curves of Pig Iron Production and Prices

The curve of pig iron production from January, 1907, to the present time is shown in the accompanying chart. The figures plotted are those of daily average production, by months, of coke and anthracite iron. The two other curves on the chart represent monthly average prices of Southern No. 2 foundry pig iron at Cincinnati and of local No. 2 foundry iron at Chicago. They are based on the weekly market quotations of *The Iron Age*. The two sets of figures are as follows:

Daily Average Production of Coke and Anthracite Pig Iron in the United States by Months Since January 1, 1907.—Gross Tons.

	1907.	1908.	1909.	1910.
January.....	71,149	33,718	57,975	84,148
February.....	73,038	37,163	60,976	85,616
March.....	71,821	39,619	59,232	84,459
April.....	73,885	38,289	57,962	82,792
May.....	74,048	37,603	60,753	77,102
June.....	74,486	36,444	64,656	..
July.....	72,763	39,287	67,793	..
August.....	72,594	43,851	72,546	..
September.....	72,783	47,300	79,507	..
October.....	75,386	50,554	83,856	..
November.....	80,937	52,595	84,917	..
December.....	39,815	56,158	85,022	..

Monthly Average Prices in Dollars of Southern No. 2 Foundry Iron at Cincinnati and Local No. 2 Foundry at Chicago Since January, 1907.

	1907.		1908.		1909.		1910.	
	Sou. No. 2.	Loc. No. 2.	Sou. No. 2.	Loc. No. 2.	Sou. No. 2.	Loc. No. 2.	Sou. No. 2.	Loc. No. 2.
Jan. ....	26.00	25.85	16.15	18.45	16.25	17.35	17.25	19.00
Feb. ....	26.00	25.85	15.75	18.16	16.13	16.75	17.06	19.00
March....	26.00	26.10	15.50	17.85	15.05	16.50	16.30	18.30
April....	25.06	26.35	15.20	17.73	14.25	16.50	15.37	17.50
May.....	24.25	23.85	14.75	17.63	14.50	16.50	15.00	17.06
June.....	24.10	26.00	15.25	17.73	14.70	16.50	..	..
July.....	23.85	25.55	15.00	17.55	15.75	17.00	..	..
Aug.....	23.00	24.85	15.25	17.35	16.38	17.13	..	..
Sept....	21.50	24.10	15.65	17.05	17.35	18.70	..	..
Oct.....	20.95	22.45	15.75	16.85	17.88	18.00	..	..
Nov.....	19.50	20.66	16.00	17.10	17.75	19.00	..	..
Dec.....	17.00	18.80	16.25	17.35	17.45	19.00	..	..

#### Production of Steel Companies

Returns from all plants of the United States Steel Corporation and the various independent steel com-



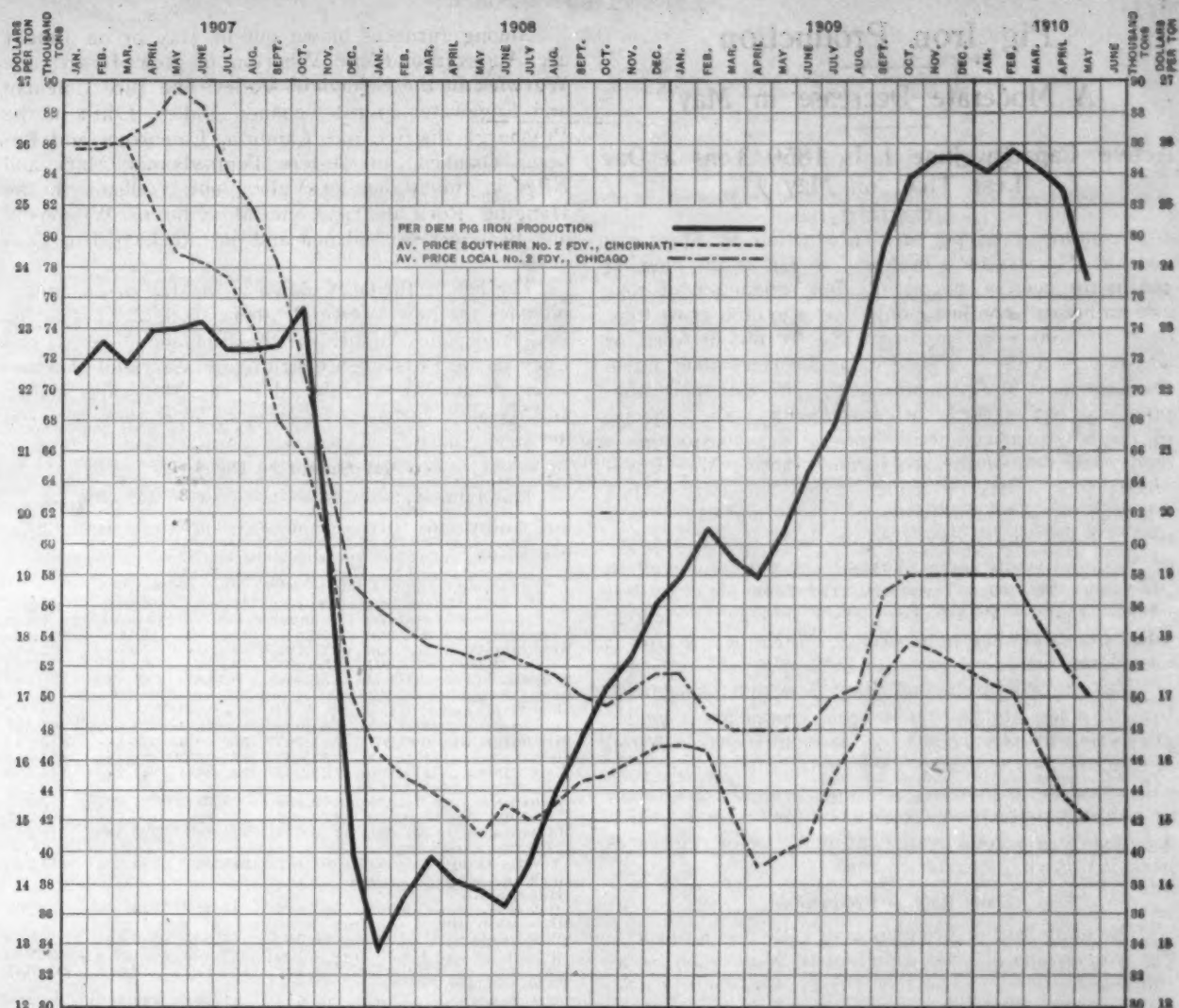


Diagram of Daily Average Production by Months of Coke and Anthracite Pig Iron in the United States from January 1, 1907, to June 1, 1910; Also of Monthly Average Prices of Southern No. 2 Foundry Iron at Cincinnati and Local No. 2 Foundry Iron at Chicago.

panies show the following totals of product month by month. Only steel-making iron is included in these figures, together with ferromanganese, spiegeleisen and ferrosilicon. These last are stated separately, but are included in the columns of "total production."

*Production of Steel Companies.—Gross Tons.*

	Pig.—Total production.—			Spiegeleisen and ferromanganese.	
	1908.	1909.	1910.	1909.	1910.
January .....	664,415	1,117,823	1,773,201	12,325	19,538
February .....	745,802	1,073,363	1,620,539	10,046	21,396
March .....	841,502	1,140,553	1,739,212	23,743	25,591
April .....	725,548	1,093,092	1,669,898	22,478	22,304
May .....	759,674	1,256,448	1,619,283	20,834	26,529
June .....	717,689	1,365,527	.....	16,516	.....
July .....	798,639	1,508,762	.....	17,613	.....
August .....	897,052	1,591,991	.....	22,313	.....
September .....	933,514	1,660,839	.....	28,148	.....
October .....	996,481	1,769,094	.....	25,384	.....
November .....	981,167	1,689,994	.....	23,376	.....
December .....	1,090,339	1,768,799	.....	20,791	.....

**The Record of Production**

*Production of Coal and Anthracite Pig Iron in the United States by Months Since January 1, 1907.—Gross Tons.*

	1907.	1908.	1909.	1910.
January .....	2,205,607	1,045,250	1,797,560	2,608,605
February .....	2,045,068	1,077,740	1,707,340	2,397,254
March .....	2,226,457	1,228,204	1,832,194	2,617,949
April .....	2,216,558	1,149,602	1,738,877	2,483,763
May .....	2,295,505	1,165,688	1,883,330	2,390,180
June .....	2,234,575	1,092,131	1,930,866	.....
July .....	2,255,060	1,218,129	2,103,431	.....
August .....	2,250,410	1,359,831	2,248,930	.....
September .....	2,183,487	1,418,998	2,385,206	.....
October .....	2,336,972	1,567,198	2,599,541	.....
November .....	1,828,125	1,577,854	2,547,508	.....
December .....	1,234,279	1,740,912	2,635,680	.....

Two of the new open hearth furnaces recently built by the Cambria Steel Company at Johnstown, Pa., have been connected up with natural gas, and two other new furnaces now being dried out will be equipped with fuel gas. Four old furnaces will also be connected up with the natural gas supply as they are put into opera-

tion after present repairs. It is possible that the furnaces of the Franklin plant of the company may also be operated with natural gas if a large supply line be extended to make this feasible.

## Trade Publications

**Brazing Cast Iron.**—Castolin Company of America, 1610 Wright Building, St. Louis, Mo. Pamphlet. Treats of the Castolin process for repairing all kinds of fractured cast iron parts. The principal advantages claimed for this method are that it enables urgent repairs to be made to castings very speedily and the work can be done without any special plant. Cast iron brazed by this process has given a tensile strain of 7½ tons per square inch on test. The illustrations in the pamphlet show a number of repairs that have been made by this process.

**Automobiles.**—Stevens-Duryea Company, Chicopee Falls, Mass. Booklet. Relates to the four-cylinder touring car built by this company, and shows the changes that have taken place in its design from 1904, when the car was first designed and test models put on the road, up to the present time. There are illustrations showing the cars of 1904 and 1910 and the power plants which each contains.

**Vacuum Cleaners.**—The Blaisdell Machinery Company, Bradford, Pa. Two booklets. The first illustrates the vacuum cleaning plant installed by this company in the Waldorf-Astoria Hotel, New York City. The views show the nozzles in use for cleaning carpets, rugs, tapestries and stucco work. The other contains fac simile reproductions of testimonial letters received from various hotels and carpet cleaning firms who have installed the Blaisdell apparatus.

**Gas Compressors.**—Ingersoll-Rand Company, 11 Broadway, New York. Form No. 3017. Covers the line of Ingersoll-Rand gas compressors and describes their construction with considerable detail. These compressors are built in eight different styles, all of which are illustrated in the pamphlet, together with a number of installations. The description of the special features is supplemented by illustrations of the various parts.

# The Iron and Metal Markets

## A Comparison of Prices

### Advances Over the Previous Month in Heavy Type, Declines in Italics.

At date, one week, one month and one year previous.

FIG IRON, Per Gross Ton:	June 8, 1910.	June 1, 1910.	May 11, 1910.	June 9, 1909.
Foundry No. 2, standard, Philadelphia.....	\$16.75	\$17.00	\$17.00	\$16.50
Foundry No. 2, Southern, Cincinnati.....	15.00	14.75	15.25	14.50
Foundry No. 2, local, Chicago.....	16.75	16.75	17.00	16.50
Basic, delivered, eastern Pa.....	16.25	16.25	17.00	15.50
Basic, Valley furnace.....	14.75	15.00	15.25	14.50
Bessemer, Pittsburgh.....	16.65	16.90	17.90	15.90
Gray forge, Pittsburgh.....	15.40	15.49	15.90	14.65
Lake Superior charcoal, Chicago.....	18.50	18.50	18.50	19.50

BILLETS, &c., Per Gross Ton:	June 8, 1910.	June 1, 1910.	May 11, 1910.	June 9, 1909.
Bessemer billets, Pittsburgh.....	25.50	25.50	26.50	23.00
Forging billets, Pittsburgh.....	31.00	31.00	32.00	25.00
Open hearth billets, Philadelphia.....	29.00	29.00	29.00	25.00
Wire rods, Pittsburgh.....	31.00	31.00	32.00	29.00
Steel rails, heavy, at mill.....	28.00	28.00	28.00	28.00

OLD MATERIAL, Per Gross Ton:	June 8, 1910.	June 1, 1910.	May 11, 1910.	June 9, 1909.
Steel rails, melting, Chicago.....	15.00	15.00	15.00	14.75
Steel rails, melting, Philadelphia.....	14.50	14.50	15.00	15.75
Iron rails, Chicago.....	17.00	17.00	17.50	17.00
Iron rails, Philadelphia.....	20.00	20.00	20.00	19.50
Car wheels, Chicago.....	15.50	15.50	16.00	16.00
Car wheels, Philadelphia.....	15.00	15.00	15.00	15.00
Heavy steel scrap, Pittsburgh.....	15.25	15.00	15.50	15.50
Heavy steel scrap, Chicago.....	13.50	13.50	13.50	14.50
Heavy steel scrap, Philadelphia.....	14.50	14.50	15.00	15.75

FINISHED IRON AND STEEL, Per Pound:	Cents.	Cents.	Cents.	Cents.
Refined iron bars, Philadelphia.....	1.50	1.52½	1.50	1.40
Common iron bars, Chicago.....	1.47½	1.47½	1.50	1.30
Common iron bars, Pittsburgh.....	1.55	1.55	1.55	1.30
Steel bars, tidewater, New York.....	1.61	1.61	1.61	1.36
Steel bars, Pittsburgh.....	1.45	1.45	1.45	1.20
Tank plates, tidewater, New York.....	1.66	1.66	1.66	1.41
Tank plates, Pittsburgh.....	1.50	1.50	1.50	1.25
Beams, tidewater, New York.....	1.66	1.66	1.66	1.41
Beams, Pittsburgh.....	1.50	1.50	1.50	1.25
Angles, tidewater, New York.....	1.66	1.66	1.66	1.41
Angles, Pittsburgh.....	1.50	1.50	1.50	1.25
Skelp, grooved steel, Pittsburgh.....	1.50	1.50	1.50	1.30
Skelp, sheared steel, Pittsburgh.....	1.60	1.60	1.60	1.40

SHEETS, NAILS AND WIRE, Per Pound:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, Pittsburgh.....	2.40	2.40	2.40	2.20
Wire nails, Pittsburgh.....	1.80	1.80	1.85	1.70
Cut nails, Pittsburgh.....	1.75	1.75	1.85	1.65
Barb wire, galv., Pittsburgh.....	2.10	2.10	2.15	2.00

METALS, Per Pound:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York.....	13.00	13.00	13.25	13.75
Electrolytic copper, New York.....	12.75	12.75	12.75	13.62½
Spelter, New York.....	5.15	5.30	5.05	5.50
Spelter, St. Louis.....	5.00	5.15	4.90	5.35
Lead, New York.....	4.37½	4.37½	4.35	4.40
Lead, St. Louis.....	4.22½	4.22½	4.20	4.30
Tin, New York.....	32.85	32.90	33.25	29.50
Antimony, Hallett, New York.....	8.12½	8.12½	8.12½	7.75
Nickel, New York.....	45.00	45.00	45.00	45.00
Tin plate, 100 lb., New York.....	\$3.84	\$3.84	\$3.84	\$3.64

\* These prices are for largest lots to jobbers.

## Prices of Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16c.; Philadelphia, 15c.; Boston, 18c.; Buffalo, 11c.; Cleveland, 10c.; Cincinnati, 15c.; Indianapolis, 17c.; Chicago, 18c.; St. Paul, 32c.; St. Louis, 22½c.; New Orleans, 30c.; Birmingham, Ala., 45c. Rates to the Pacific Coast are 80c. on plates, structural shapes and sheets, No. 11 and heavier; 85c. on sheets, Nos. 12 to 16; 95c. on sheets, No. 16 and lighter; 65c. on wrought pipe and boiler tubes.

**Structural Shapes.**—I-beams and channels, 3 to 15 in., inclusive, 1.50c. to 1.55c., net; I-beams over 15 in., 1.65c., net; H-beams over 8 in., 1.75c.; angles, 3 to 6 in., inclusive, ¼ in. end up, 1.60c., net; angles over 6 in., 1.65c., net; angles, 3 x 3 in. and up, less than ¼ in., 1.75c., base, half extras, steel bar card; tees, 3 in. and up, 1.65c., net; zeos, 3 in. and up, 1.60c., net; angles, channels and tees, under 3 in., 1.50c., base, plus 10c., half extras, steel bar card; deck

beams and bulb angles, 1.80c., net; hand rail tees, 2.80c., net; checkered and corrugated plates, 2.80c., net.

**Plates.**—Tank plates, ¾ in. thick, 6¼ in. up to 100 in. wide, 1.50c. to 1.55c., base. Following are stipulations prescribed by manufacturers, with extras to be added to base price (per pound) of plates:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated February 6, 1903, or equivalent, ¼-in. thick and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per square foot are considered ¼-in. plates. Plates over 72 in. wide must be ordered ¼-in. thick on edge, or not less than 11 lb. per square foot, to take base price. Plates over 72 in. wide ordered less than 11 lb. per square foot down to the weight of 3-16-in. take the price of 3-16-in.

Allowable overweight, whether plates are ordered to gauge or weight, to be governed by the standard specifications of the Association of American Steel Manufacturers.

Gauges under ¼-in. to and including 3-16-in. on thinnest edge.....	\$0.10
Gauges under 3-16-in. to and including No. 8.....	.15
Gauges under No. 8 to and including No. 9.....	.25
Gauges under No. 9 to and including No. 10.....	.30
Gauges under No. 10 to and including No. 12.....	.40
Sketches (including all straight taper plates), 3 ft. and over in length.....	.10
Complete circles, 3 ft. diameter and over.....	.20
Boiler and flange steel.....	.10
"A. B. M. A." and ordinary firebox steel.....	.20
Still bottom steel.....	.30
Marine steel.....	.40
Locomotive firebox steel.....	.50
Widths over 100 in. up to 110 in., inclusive.....	.05
Widths over 110 in. up to 115 in., inclusive.....	.10
Widths over 115 in. up to 120 in., inclusive.....	.15
Widths over 120 in. up to 125 in., inclusive.....	.25
Widths over 125 in. up to 130 in., inclusive.....	.50
Widths over 130 in.....	1.00
Cutting to lengths or diameters under 3 ft. to 2 ft., inclusive.....	.25
Cutting to lengths or diameters under 2 ft. to 1 ft., inclusive.....	.50
Cutting to lengths or diameters under 1 ft.....	1.55
No charge for cutting rectangular plates to lengths 3 ft. and over.	

TERMS.—Net cash 30 days.

**Sheets.**—Minimum prices for mill shipments on sheets in carload and larger lots, on which jobbers charge the usual advances for small lots from store, are as follows: Black annealed sheets, Nos. 3 to 8, 1.70c.; Nos. 9 and 10, 1.75c.; Nos. 11 and 12, 1.80c.; Nos. 13 and 14, 1.85c.; Nos. 15 and 16, 1.95c. Box annealed sheets, Nos. 17 and 21, 2.20c.; Nos. 22 to 24, 2.25c.; Nos. 25 and 26, 2.30c.; No. 27, 2.35c.; No. 28, 2.40c.; No. 29, 2.45c.; No. 30, 2.55c. Galvanized sheets, Nos. 13 and 14, 2.50c.; Nos. 15 and 16, 2.60c.; Nos. 17 to 21, 2.75c.; Nos. 22 to 24, 2.90c.; Nos. 25 and 26, 3.10c.; No. 27, 3.30c.; No. 28, 3.50c.; No. 29, 3.60c.; No. 30, 3.85c. Painted roofing sheets, No. 28, \$1.70 per square. Galvanized roofing sheets, No. 28, \$3 per square, for 2½-in. corrugations.

**Wrought Pipe.**—The following are the discounts on the Pittsburgh basing card on carloads of wrought pipe now in effect:

	Steel.	Black.	Galv.	Black.	Galv.
¾ and ¼ in.....	70	54	66	53	53
¾ in.....	71	57	67	53	53
½ in.....	74	62	70	58	58
¾ to 6 in.....	78	68	74	64	64
7 to 12 in.....	72	57	68	53	53
Plugged and Reamed.					
1 to 4 in.....	76	66	72	62	62
Extra Strong, Plain Ends.					
¾ to ¾ in.....	63	51	59	47	47
¾ to 4 in.....	70	58	66	54	54
4½ to 8 in.....	66	54	62	50	50
9, 10, 11 and 12 in.....	54	42	..	..	..
Double Extra Strong, Plain Ends.					
¾ to 8 in.....	59	48	55	44	44

The above steel pipe discounts are for "card weight," subject to the usual variation of 5 per cent.

**Boiler Tubes.**—Discounts on lap welded steel and charcoal iron boiler tubes to jobbers in carloads are as follows:

	Steel.	Iron.
1 to 1½ in.....	49	43
1½ to 2½ in.....	61	43
2½ in.....	63	48
2½ to 5 in.....	69	55
6 to 13 in.....	61	43

2½ in. and smaller, over 18 ft., 10 per cent. net extra.  
2½ in. and larger, over 22 ft., 10 per cent. net extra.  
Less than carloads to destinations east of the Mississippi River will be sold at delivered discount for carloads lowered by two points, for lengths 22 ft. and under; longer lengths, f.o.b. Pittsburgh.

**Wire Rods.**—Bessemer, open hearth and chain rods, \$31.

**Steel Rivets.**—Structural rivets, ¾-in. and larger, 2.15c., base; cone head boiler rivets, ¾-in. and larger, 2.25c., base; ¾-in. and 11-16-in. take an advance of 15c., and ½-in. and 9-16-in. take an advance of 50c.; in lengths shorter than 1-in. also take an advance of 50c. Terms are 30 days, net cash, f.o.b. mill. The above prices are absolutely minimum on contracts for large lots, makers charging the usual advances of \$2 to \$3 a ton to the small trade.



# THE IRON AND METAL MARKETS

## Pittsburgh

PARK BUILDING, June 8, 1910.—(By Telegraph.)

**Pig Iron.**—The leading steel castings company has bought 15,000 tons of basic iron for last half of the year delivery at \$14.75, Valley furnace, for shipment to its plant at Alliance, Ohio, and to another of its plants at East St. Louis. A Shenango Valley steel castings company has closed with a Valley furnace for its entire supply of basic and Bessemer iron for the last half of the year, which will amount to about 2500 tons a month. Bids have gone in on the inquiry of the Westinghouse Air Brake Company for 1000 tons of No. 2 foundry and 1000 tons of forge, and some low prices were quoted. It is believed that there will be considerable buying of pig iron within the next 30 days. We quote Bessemer iron at \$15.75 to \$16; malleable Bessemer, \$15 to \$15.25; basic, \$14.75 to \$15; No. 2 foundry, \$14.75 to \$15, and gray forge, \$14.50, all at Valley furnace, with a freight rate of 90c. a ton for delivery in the Pittsburgh district.

**Steel.**—Very little contracting has been done as yet on billets and sheet and tin bars by consumers for third quarter delivery. Local mills are receiving good specifications against contracts, and are holding Bessemer billets at \$25.50 to \$26 and sheet and tin bars \$26.50 to \$27. A local tin plate company is in the market for 3000 to 4000 tons of tin bars for reasonably prompt shipment. We quote Bessemer billets at \$25.50 to \$26, and sheet bars, \$26.50 to \$27; 4 x 4 in. open hearth billets, \$28 to \$28.50; open hearth small billets, \$29 to \$29.50; open hearth sheet and tin bars, \$28.50 to \$29, and forging billets, \$31 to \$32, all f.o.b. Pittsburgh, freight to destination added.

(By Mail.)

The injunction against the railroads secured last week by the Federal Government did not materially affect the situation here, as it was believed that the matter would be arranged in some way to the satisfaction of both shippers and railroads. The fact is that local conditions in the steel trade are showing some improvement, and the feeling as to the future is more optimistic than for some time. Prices on pig iron having reached a very low point, the most important consumers are buying and have inquiries out for large blocks for last half of the year delivery. One leading interest has bought 15,000 tons of basic for remainder of the year delivery at a very low price, and there have been small sales of Bessemer by dealers at \$15.75 at Valley furnace, and also of Northern No. 2 foundry as low as \$14.50 and \$14.75 at furnace. The market on Bessemer steel continues weak, but a recent sale of 3000 tons of billets by an Ohio River mill at \$26, delivered Canton, Ohio, netting the seller less than \$25 at mill, should not be construed to mean that Bessemer billets have reached \$25 or lower, Pittsburgh, for none of the local mills will sell at that price. In finished material, conditions are showing betterment, actual orders placed for plates, structural material, pipe and wire products showing a decided increase. There is also much better movement in scrap and it is generally believed that prices have reached bottom. The coke trade continues dull, but prices on furnace coke are reported as showing a firmer tendency. The outlook for the immediate future is regarded as more encouraging, and it is the opinion that within 60 days general conditions will show very material improvement.

**Ferromanganese.**—Prices are weak. Imported 80 per cent. ferro is being freely offered for prompt shipment at \$39.50 to \$39.75, Baltimore. The freight rate to Pittsburgh is \$1.95 a ton.

**Ferrosilicon.**—On this material prices are also weak; 50 per cent. being offered as low as \$58, Pittsburgh. A sale of about 75 tons is reported at that price for June and July delivery. We quote 10 per cent. at \$23; 11 per cent., \$24, and 12 per cent., \$25, all at Ashland furnace, to which \$1.90 a ton should be added for delivery in the Pittsburgh district.

**Rods.**—The market continues quiet, but there is a moderate inquiry for small lots for prompt shipment. Rods from open hearth stock are very firm, but Bessemer soft steel rods are weaker. We quote Bessemer rods at \$31 and open hearth and chain rods at \$32, Pittsburgh. A sale is reported of about 300 tons of Bessemer rods for prompt delivery at \$31, f.o.b. Pittsburgh.

**Skelp.**—Additional large contracts for line pipe have been placed, and several local pipe mills that participated in these contracts have been heavy buyers of universal plates, while inquiries for additional large tonnage are still in the market. For ordinary widths and gauges we quote grooved steel skelp at 1.50c. to 1.55c.; sheared steel skelp, 1.60c. to 1.65c.; grooved iron skelp, 1.80c., and sheared iron skelp, 1.90c., all f.o.b. mill, Pittsburgh.

**Steel Rails.**—Last week the Carnegie Steel Company

entered new orders for about 3500 tons of light rails and received specifications against contracts for 1900 tons. It has also recently made some heavy sales of axles and splice bars, and its Howard Axle Works is running full, while the splice bar department at Duquesne is also operating to capacity. Active work has been started on the new splice bar mill which the Carnegie Company will build adjacent to its Edgar Thomson rail mills at Bessemer, and when it is finished all the splice bars will be made at Bessemer. No important contracts for standard sections have been taken, but the company is receiving small orders right along, two of these in the past week, each amounting to 1000 tons. We quote steel axles at 1.75c. to 1.80c., and splice bars, 1.50c., at mill, Pittsburgh. Light rail prices are as follows: 8 to 10 lb., \$32; 12 to 14 lb., \$29; 16, 20 and 25 lb., \$28; 30 and 35 lb., \$27.75, and 40 to 45 lb., \$27, Pittsburgh. These prices are for 250-ton lots and over, and for small lots premiums of 50c. per ton and more are being paid. We quote standard sections at \$28, at mill.

**Structural Material.**—New inquiries have been decidedly better, and some fairly large jobs have been given out. The American Bridge Company has taken 5000 tons for the new factory of the Pittsburgh Plate Glass Company at Ford City, Pa. The King Bridge Company, Cleveland, has taken 1200 tons for bridge work for the Nickel Plate, and the Fort Pitt Bridge Works has taken 500 tons of bridge work for the Pennsylvania Lines West. There is still a good deal of complaint about low prices going for fabrication. We continue to quote beams and channels up to 15-in. at 1.50c., Pittsburgh.

**Plates.**—The Baltimore & Ohio has placed an order for 1000 box cars, with steel underframes, with the South Baltimore Car & Foundry Company. A local pipe interest that has recently secured a contract for a very large gas line in the West has placed contracts for 7000 tons of universal plates, equally divided between a local plate mill and an Eastern mill. The boat building interests on the lakes are short of work just now, and several of them are contemplating the building of five or six ore boats to keep their shops employed and taking chances later on of disposing of them. Some of the small plate mills that do not roll a full assortment of sizes, or plates wider than 72 in., are still naming 1.45c., but the leading plate mills claim they are not meeting this price. We continue to quote ¼-in. and heavier plates at 1.50c., Pittsburgh.

**Sheets.**—The demand for the lighter gauges of black and galvanized sheets is rather quiet, and some mills are offering concessions of \$2 to \$3 a ton, but only on orders for prompt shipment. In specialties, such as blue annealed, electrical and deep stamping sheets, the demand is active, and prices are being firmly held. In fact, in some cases slight premiums are being paid for prompt deliveries on both blue annealed and electrical sheets. The American Sheet & Tin Plate Company is operating practically full all of its sheet mills, with the exception of the Aetna-Standard Works at Bridgeport, which has been idle for nearly a year, and the Canton plant, which is idle on account of the recent boiler explosion. Regular prices on black, galvanized and roofing sheets will be found on a previous page.

**Tin Plate.**—The buying season in tin plate is about over and few new orders are being placed. Consumers of tin plate are more concerned just now in getting deliveries on contracts already placed, and on which the mills are considerably behind in shipments. The American Sheet & Tin Plate Company, although operating to practically full capacity in all its mills, is practically sold up on all it can make this year, and this is also true of a number of the leading outside mills. Prices are very firm. We quote 100-lb. cokes at \$3.60 per base box, f.o.b. Pittsburgh.

**Bars.**—The implement makers and wagon builders continue to specify liberally on their contracts for steel bars, and the leading mills are filled up for the next 90 days or longer, and are considerably behind in shipments. The situation in iron bars is not so active, the new demand being only fair, and specifications are not coming in as freely as desired. We continue to quote steel bars at 1.45c. and common iron bars at 1.55c., f.o.b. Pittsburgh.

**Hoops and Bands.**—New business is being received by the mills in moderate volume, while specifications against contracts are coming in quite freely. Shipments by the mills in May showed a considerable increase over April, and this month promises to be still heavier. Prices are only fairly strong and are feeling the effects of the decline in soft steel billets. We quote steel hoops for forward delivery at 1.50c. to 1.60c., while for prompt shipment as high as 1.65c. is obtainable. Steel bands are 1.40c. to 1.50c. on contracts for forward delivery and 1.60c. to 1.65c. for reasonably prompt shipment, these carrying steel bar card extras.

**Spelter.**—The market has again shown a sharp decline.

## THE IRON AND METAL MARKETS

We note a sale of about 100 tons for July, August and September shipment at about 5.10c., delivered Pittsburgh.

**Spikes.**—As yet orders from the railroads for spikes are confined to small lots for repair work, but it is said that two or three of the large Western roads and one Eastern trunk line will soon be in the market with some fairly large inquiries for delivery over the last half of the year. Makers advise us that the new demand for small railroad and boat spikes is quite active and has been for some time. We quote standard sizes of railroad spikes,  $4\frac{1}{2}$  x 9-16 in. and larger, at \$1.60 to \$1.65 for Western shipment and \$1.65 to \$1.70 for local trade. Boat and small railroad spikes are firm, at \$1.75, base, these prices being for carload and larger lots.

**Rivets.**—Consumers are buying mostly for needed requirements and are not yet willing to contract for delivery ahead. Prices in the main are well observed, but are sometimes slightly shaded by some of the small makers. We continue to quote structural rivets at 2.15c. and boiler rivets at 2.25c., f.o.b. Pittsburgh.

**Shafting.**—The new demand for shafting continues heavy, as has been the condition practically all of this year. Large jobbers are specifying freely against contracts and all of the shafting makers are considerably behind in deliveries. Regular discounts, which are 55 per cent. off in carload and larger lots and 50 per cent. in small lots, delivered in base territory, are reported as being well maintained.

**Wire Products.**—The improvement in the new demand for wire products, which started about May 20, is keeping up, and so far this month new orders entered by the mills and specifications received against contracts show quite a large increase over the first week in May. The mills expect a still larger demand and believe that the industry is about to enjoy a very prosperous season. Prices are reported as being fairly well maintained. We quote wire nails at \$1.80 in carload and larger lots; galvanized barb wire, \$2.10; painted, \$1.80; annealed fence wire, \$1.60; galvanized, \$1.90; cut nails, \$1.75 to \$1.80, all f.o.b. cars, Pittsburgh, with usual terms, and freight to destination added.

**Merchant Pipe.**—Spang, Chalfant & Co., Inc., have booked a contract for 6000 tons of 18-in. pipe for a gas line for delivery in the West. A western Pennsylvania gas interest is in the market for 37 miles of 10-in. The order for 10 miles of 20-in. pipe for the Ohio Fuel Supply Company was secured by the Mark Mfg. Company of Chicago, with mills at Zanesville, Ohio, and not by the Youngstown Sheet & Tube Company as reported. Some very large inquiries for line pipe are in the market from the Pacific Coast, and indications are that at least part of this business will be placed in the near future. Several of the leading pipe mills are now filled up on large pipe for the remainder of this year. The merchant pipe business continues unsatisfactory, the demand being dull and showing no signs of immediate betterment. We are advised that the regular discounts on both iron and steel pipe, printed on a previous page in this issue, are being maintained.

**Boiler Tubes.**—The new demand for locomotive tubes is quite heavy. Spang, Chalfant & Co., Inc., have received an order for about 22,000 tubes for 65 locomotives being built by the Missouri, Kansas & Texas Railroad. Other heavy contracts for locomotive tubes are expected to be placed in the near future, these inquiries now being in the market. The demand for merchant tubes is moderate, but the mills could take care of more business. It is stated that regular discounts on locomotive and merchant tubes printed on a previous page are being maintained.

**Coke.**—The recent consolidation of three or four of the larger coke interests in the Connellsville region is reported to have given a firmer tone to the market, but so far this is not much in evidence. The blast furnaces that buy coke in the open market have practically all covered for their requirements for the last half of the year, and new inquiry is light. The demand for 72-hour foundry coke, however, is quite active and several large contracts for the remainder of this year have been closed in the past week. We continue to quote standard makes of furnace coke running under 1 per cent. in sulphur for delivery over this year at \$1.75 to \$1.85 per net ton, at oven, and \$1.65 to \$1.70 on coke loaded on cars for prompt shipment. Standard makes of 72-hour foundry coke for the remainder of this year are fairly strong at \$2.15 and up to \$2.40 per net ton, at oven, to consumers. Stocks of coke in yards are still quite heavy, and a good deal is being sold at low prices that is on cars and must be moved. The output in the Upper and Lower Connellsville regions last week was 396,443 net tons, an increase over the previous week of 3000 tons. The matter of establishing a central selling agency to handle the coke of the independent operators is again being agitated, but it is not believed that anything will come of it.

**Iron and Steel Scrap.**—In the early part of last week the feeling in the local scrap market was decidedly better,

and quite a heavy tonnage of scrap was sold by dealers to consumers at slightly better prices than have prevailed in this market for some time. The railroad injunction bill had the effect of unsettling the market. The list recently sent out by the Pennsylvania Railroad included about 10,000 tons of relaying rails and upward of 15,000 tons of other grades of scrap. Some consumers who have been holding up shipments of scrap are again taking in material in fairly large lots. Prices are without material change. Dealers quote about as follows: per gross ton, for delivery at Pittsburgh or elsewhere as noted:

Heavy steel scrap, Steubenville, Folsom, Sharon, Monessen and Pittsburgh delivery.....	\$15.25 to \$15.50
No. 1 foundry cast.....	14.25 to 14.50
No. 2 foundry cast.....	13.25 to 13.50
Bundled sheet scrap, at point of shipment.....	10.50 to 10.75
Rerolling rails, Newark and Cambridge, Ohio, and Cumberland, Md.....	16.00 to 16.25
No. 1 railroad malleable scrap.....	14.25 to 14.50
Grate bars.....	11.00 to 11.25
Low phosphorus melting stock.....	18.50 to 19.00
Iron car axles.....	25.00 to 25.25
Steel car axles.....	21.00 to 21.25
Locomotive axles.....	26.00 to 26.25
No. 1 bushelling scrap.....	13.50 to 13.75
No. 2 bushelling scrap.....	9.00 to 9.25
Old car wheels.....	14.00 to 14.25
Sheet bar crop ends.....	17.00 to 17.25
Cast iron borings.....	8.00 to 8.25
Machine shop turnings.....	9.75 to 10.00

Sales have been made of 1000 tons of turnings at \$10.10 and \$10.25, delivered, carrying a 60c. freight rate, and 6000 to 8000 tons of heavy steel scrap at \$15.25 to \$15.50, delivered, Sharon and Monessen, Pa. A local dealer reports a sale of 500 tons of low phosphorus melting stock, guaranteed under 0.04, at \$19. Other sales are 900 to 1000 tons of grate bars at \$12, delivered, with a freight rate of 60c.; 2000 to 3000 tons of turnings at \$10.25, delivered, and 2500 to 3000 tons of borings at \$8.50 to \$9, delivered, with a freight rate of 60c.

### Chicago

FISHER BUILDING, June 8, 1910.—(By Telegraph.)

While official confirmation cannot be obtained from Chicago representatives of the United States Steel Corporation, it is reported on good authority that contracts have been let for machinery and other equipment for the construction of eight additional blast furnaces at Gary, Ind. This will complete the original project for 16 furnaces, and the letting of contracts at this time has an important bearing on market conditions, as it indicates that the farseeing officials of the leading interest have confidence in the future. Recently *The Iron Age* reported that contracts had been let and construction begun on a second power plant at Gary, comprising gas engines and electric generators of 40,000 hp. This plant will be operated in connection with four of the new blast furnaces which will supply it with gas and is a part of the general plan for additional construction at Gary. Another fortunate event in its effect on market conditions is the prompt settlement of the national contest in the courts over freight rates. While the railroads have temporarily abandoned their attempt to advance rates, they will bring the matter up before the Interstate Commerce Commission in a legal way as soon as the bill now pending in Congress is passed, and the commission will undoubtedly allow them whatever advance the railroads can show is reasonable. Western shippers are generally of the opinion that the prosperity of the country will be prompted by this settlement, which clears up a cloud that has been hanging over the market for many months. A distinctly better tone has appeared in the trade since Monday. Last week new business was rather light in the steel industry. Only a few structural contracts were closed and railroad buying was at a standstill. Concessions were reported on structural material and plates as well as keen competition for going business among the sheet mills. New business in bar iron was light and there was a general hesitation all around in forward buying. This week there is general confidence that a turning point has been reached and more active buying may be expected, especially on forward business.

**Pig Iron.**—As reported last week, a local open hearth interest bought 10,000 tons of basic from a large Southern producer. A leading steel foundry interest has since bought 15,000 tons of basic from the same producer, and a steel foundry at St. Louis has bought 10,000 tons. Several sales of malleable Bessemer have been made, and a considerable amount of both Northern and Southern foundry is being purchased. The actual business done, however, is confined chiefly to prompt and third quarter iron. Buyers and sellers are still a considerable distance apart on both Northern and Southern grades for last half. There are indications, however, of a little more interest in the market on the part of



# THE IRON AND METAL MARKETS

buyers. Until recently inquiries have been of a desultory and indifferent character. In the past few days, however, all the leading Southern interests in this market have in turn declined firm offers that were made them of \$11.50 for second half, these offers running all the way from 500 to 2000 tons each and aggregating 8000 to 10,000 tons. The established brands of Southern furnaces are all held at \$12 for last half delivery, although there are persistent reports of \$11.50 being quoted for last half. On prompt iron and shipments running into the third quarter the market is practically unchanged, and buyers have little difficulty in getting what they need at \$11.50. Many of the inquiries now reported run into the first quarter of 1911 on both Northern and Southern foundry grades. The following quotations are June shipment, Chicago delivery:

Lake Superior charcoal.....	\$18.50 to \$19.00
Northern coke foundry, No. 1.....	17.25 to 17.75
Northern coke foundry, No. 2.....	16.75 to 17.25
Northern coke foundry, No. 3.....	16.25 to 16.75
Northern Scotch, No. 1.....	17.75 to 18.25
Southern coke, No. 1.....	16.35 to 16.85
Southern coke, No. 2.....	15.85 to 16.35
Southern coke, No. 3.....	15.60 to 16.10
Southern coke, No. 4.....	15.35 to 15.85
Southern coke, No. 1 soft.....	16.35 to 16.85
Southern coke, No. 2 soft.....	15.85 to 16.35
Southern gray forge.....	15.10 to 15.60
Southern mottled.....	14.85 to 15.35
Malleable Bessemer.....	16.75 to 17.25
Standard Bessemer.....	18.40 to 18.90
Jackson Co. and Kentucky silvery, 6%.....	19.40 to 19.90
Jackson Co. and Kentucky silvery, 8%.....	20.40 to 20.90
Jackson Co. and Kentucky silvery, 10%.....	21.40 to 21.90

(By Mail.)

**Billets.**—There is very little inquiry for either forging or rolling billets and Pittsburgh prices govern on the occasional orders that are taken by Eastern mills in this market.

**Rails and Track Supplies.**—No important sales of standard rails are reported, but the mills are booking new business for track supplies, as well as specifications, at a normal rate. We quote standard railroad spikes at 1.80c. to 1.90c., base; track bolts with square nuts, 2.50c. to 2.60c., base, all in carloads, Chicago. Light rails, 40 to 45 lb., \$27; 30 to 35 lb., \$27.75; 16, 20 and 25 lb., \$28; 12 lb., \$29, Chicago.

**Structural Material.**—The American Bridge Company has booked an order for 500 tons for the Orpheum Theatre in Seattle, Wash., and 250 tons for a bridge in the State of Washington for the Chicago, Milwaukee & Puget Sound Railroad. A packing house building for Swift & Co., Fort Worth, Texas, 480 tons, went to the Mosher Mfg. Company, Dallas, Texas. The Modern Structural Steel Company, Waukesha, Wis., will fabricate the steel for the Heisen Building, Chicago, 4500 tons. The plain material, which has been purchased direct from the mill by Mr. Heisen, will come by water from Buffalo to Milwaukee. The market price of plain material from mill is generally maintained on current business, but it is understood that prices have been shaded recently on attractive specifications. We quote plain material from mill, 1.68c. to 1.73c., Chicago; from store, 1.90c. to 2c., Chicago.

**Plates.**—The mills have not received specifications as yet for the steel car orders that were taken during May by the car builders, but it is understood that there will be no cancellations or delays on these car contracts. The local mills have enough business to carry them until these specifications come in, and will probably run full for several months on the business now in prospect. An early settlement of the controversy over freight rates will undoubtedly bring out large car orders in July, for which Western roads are preparing data. We quote mill prices at 1.68c. to 1.73c., Chicago; store prices, 1.90c. to 2c., Chicago.

**Sheets.**—There is keen competition among the mills for the business that is going, and prices are being shaded 5c. to 10c. per 100 lb. on black sheets and 10c. to 15c. on galvanized wherever buyers seek to avail themselves of concessions offered by Eastern mills. A new mill of the Inland Steel Company has been started on blue annealed sheets, so that better deliveries can be given on the heavier gauges than have been available in this market since last fall. We quote as follows, Chicago: No. 10 annealed, 1.93c.; No. 28 black, 2.58c.; No. 28 galvanized, 3.68c. Prices from store, Chicago, are: No. 10 blue annealed, 2.25c. to 2.35c.; No. 28 black, 3c. to 3.10c.; No. 28 galvanized, 4c. to 4.10c.

**Bars.**—The bar iron market continues very quiet, as the railroads show no inclination under present conditions to place contracts for their requirements for the last half of the year. There is a good demand for steel bars for concrete work and manufacturers who recently bought soft steel bars for the coming year are specifying early for large quantities. Subject to the usual delay in delivery of soft steel bars, we quote as follows: Soft steel bars, 1.63c. to

1.68c.; bar iron, 1.47½c. to 1.52½c.; hard steel bars rolled from old rails, 1.50c. to 1.60c., all Chicago.

**Rods and Wire.**—The fence manufacturers are beginning to place contracts for their requirements for the third quarter, and it is expected that soon after July 1 industrial buyers of wire products will be able to cover their requirements for the last half. The wire interests are profiting by the prosperous condition of the farmers, and this branch of the steel industry is holding up better than any other finishing department except bars, on which the demand also comes from agricultural sources. No change is reported in prices. Jobbers' carload prices, which are quoted to manufacturing buyers, are as follows: Plain wire, No. 9 and coarser, base, 1.83c.; wire nails, 2.03c.; painted barb wire, 2.03c.; galvanized, 2.33c., all Chicago.

**Merchant Steel.**—Contracts for special grades of agricultural steel are running about 50 per cent. larger than the quantities bought in any former year by the implement manufacturers, and specifications are being given to insure earlier deliveries than were obtained last year. In some lines of merchant steel the demand is not so urgent, but a fair volume of business is being done from store.

**Cast Iron Pipe.**—No large municipal lettings are reported for the past week, but the leading interest in this market has taken a good run of orders and lettings from small municipalities, amounting to several thousand tons. The largest of these orders was from Essexville, Mich., for about 500 tons. On current business we quote, per net ton, Chicago, as follows: Water pipe, 4-in., \$28.50; 6 to 12 in., \$27.50; 16-in. and up, \$26.50, with \$1 extra for gas pipe.

**Metals.**—The prices quoted by jobbers in this market remain practically unchanged, as the fluctuations in basic prices are within narrow limits. There was good buying of spelter last week, but there are not so many inquiries this week. A fair amount of business is being done in copper and tin. We quote Chicago prices as follows: Casting copper, 12½c.; lake, 13½c., in carloads, for prompt shipment; small lots, ¼c. to ½c. higher; pig tin, car lots, 33½c.; small lots, 35c.; lead, desilverized, 4.30c. to 4.35c., for 50-ton lots; corroding, 4.55c. to 4.60c. for 50-ton lots; in carloads, 2½c. per 100 lb. higher; spelter, 5.30c. to 5.35c.; Cookson's antimony, 10½c., and other grades, 9½c. to 10½c.; sheet zinc is \$7.50, f.o.b. La Salle, in carloads of 600-lb. casks. On old metals we quote for less than carload lots: Copper wire, crucible shapes, 13c.; copper bottoms, 11c.; copper clips, 12½c.; red brass, 12c.; yellow brass, 9½c.; light brass, 7c.; lead pipe, 4½c.; zinc, 4.40c.; pewter, No. 1, 24c.; tin foil, 26c.; block tin pipe, 30c.

**Old Material.**—Just when mills and other consumers of scrap had begun to take an interest in the market the recent railroad agitation came forward and has created a temporary period of uncertainty. The effect on prices, however, has been relatively slight. Values continue about the same this week, although there is an undertone of weakness in conditions. The agitation has had less effect in fact than open offerings of about 20,000 tons from Western railroads and private sales of old material by the same interests of unknown amount. The larger offerings of rerolling rails have weakened the market in that line of material and locomotive tires are also in less demand than during the winter when they were eagerly sought by shovel manufacturers. Dealers are able to move at present prices all the material that arrives for disposition and the market seems to have worked off the congestion that prevailed during April and May. Following prices are per gross ton, delivered, Chicago:

Old iron rails.....	\$17.00 to \$17.50
Old steel rails, rerolling.....	18.50 to 17.00
Old steel rails, less than 3 ft.....	15.00 to 15.50
Rerolling rails, standard sections, subject to inspection.....	24.00 to 25.00
Old car wheels.....	13.50 to 16.00
Heavy melting steel scrap.....	13.50 to 14.00
Frogs, switches and guards, cut apart.....	13.50 to 14.00
Shoveling steel.....	13.00 to 13.50

The following quotations are per net ton:

Iron angles and splice bars.....	\$15.00 to \$15.50
Iron car axles.....	20.00 to 20.50
Steel car axles.....	20.00 to 20.50
No. 1 railroad wrought.....	12.75 to 13.25
No. 2 railroad wrought.....	11.75 to 12.25
Springs, knuckles and couplers.....	12.50 to 13.00
Locomotive tires, smooth.....	17.00 to 17.50
No. 1 dealers' forge.....	11.00 to 11.50
Steel axle turnings.....	9.50 to 10.00
Machine shop turnings.....	8.00 to 8.50
Cast and mixed borings.....	5.00 to 5.50
No. 1 bushing.....	10.50 to 11.00
No. 2 bushing.....	8.00 to 8.50
No. 1 boilers, cut to sheets and rings.....	9.50 to 10.00
No. 1 cast scrap.....	13.00 to 13.50
Stove plate and light cast scrap.....	11.00 to 11.50
Railroad malleable.....	12.50 to 13.00
Agricultural malleable.....	11.50 to 12.00
Pipes and flues.....	9.50 to 10.00

# THE IRON AND METAL MARKETS

## Philadelphia

PHILADELPHIA, PA., June 7, 1910.

The market has had somewhat of a setback, due to the action of the Government in connection with the proposed advance in freight rates. The checking of buying was quite pronounced. Further efforts to get prices of both crude and finished materials on a lower level are to be noted, inquiries still being quite heavy, particularly for forward deliveries, and concessions have in instances been made. Orders for steel billets are light, and \$29, delivered in this territory, now represents the top of the market for basic open hearth rolling billets. Refined iron bars are somewhat easier. The old material market has a slightly better tone, although little business has been transacted.

**Pig Iron.**—Actual transactions have not been heavy and the market has developed irregularity. The bulk of the business placed has been in foundry grades, for which inquiries continue numerous, in some case several thousand tons being asked for. Consumers are testing the market carefully, particularly for somewhat extended deliveries. The larger share of the orders placed has been in moderate sized lots, principally for prompt and third quarter delivery, on which prices for No. 2 X foundry range from \$16.75 to \$17, delivered in this vicinity. While a number of sellers will not openly quote under \$17, business will, in many instances, be accepted at the inside figure, and some of the less well-known brands might even be had at a shade less. Buyers still show considerable hesitancy in placing orders for any round tonnage, while sellers are not anxious to load up order books at the present price level, although they might be willing to accept some desirable business which would serve in the nature of a back log. Very little business has been done in Virginia foundry grades; sellers, as a rule, quote \$14.25, furnace, for No. 2 X, for third quarter shipment, although in instances \$14 is accepted, which makes a somewhat wider spread in the delivered price, which ranges according to the freight rate from \$16.80 to \$17.25, delivered here. The usual differential for No. 2 plain has, in instances, been withdrawn when the lower price is named for No. 2 X, both grades being quoted on the same basis, \$14, at furnace. Cast iron pipe interests have not been active buyers during the week. Odd lots of low grade iron are being picked up and consumers would place good orders at a somewhat lower range of prices if they could be had, but sellers have not yet met buyers' ideas. Some small lots of Southern No. 2 foundry have been sold for near future delivery at the \$12, Birmingham, basis. Further sales of Northern forge iron for mill purposes are reported at \$15, furnace, several 1000-ton lots being taken at prices ranging from \$15.75 to \$16, delivered. Sales of low phosphorus iron have been more numerous. One lot for several thousand tons for last half shipment, which was before the trade last week, was bought by an Eastern consumer at a price equal to \$23, delivered here. Several small lots to consumers in this immediate vicinity were also sold on the same basis. The demand for basic iron still drags, consumers in this territory continuing to show no interest in the market, and, while \$16.25 is nominally quoted, there is little doubt that \$16 could be done for a round block. A sale of several thousand tons of Virginia basic for Western delivery is reported. As this transaction involved a rearrangement of a balance on an old contract, the price was not a factor in fixing the present market. The following range of quotations is named for standard brands, delivered in buyers' yards in this vicinity, for either prompt or last half shipment:

Eastern Pennsylvania, No. 2 X foundry.....	\$16.75 to \$17.00
Eastern Pennsylvania, No. 2 plain.....	16.50 to 16.75
Virginia, No. 2 X foundry.....	16.75 to 17.25
Virginia, No. 2 plain.....	16.75 to 17.00
Gray forge.....	15.75 to 16.00
Basic.....	16.25
Standard low phosphorus.....	23.00 to 23.25

**Ferromanganese.**—The market is in rather unsatisfactory shape, 80 per cent. ferro being freely offered at \$40, seaboard, for extended shipment, without inducing purchases. Consumers in the East show practically no interest in the market, but some little Western business is said to be still floating about. A Western consumer is understood to be in the market for a good sized block of spiegeleisen, against which it is said some tonnage has been purchased.

**Billets.**—While there is plenty of business in sight, consumers are not inclined to come into the market, particularly when prices show a weakening tendency. Specifications are being freely received against old orders, and mills in this district are fully engaged, but the lack of new business is making itself felt. Prices are lower, standard basic open hearth rolling billets being quoted at \$29, delivered in this territory, while less well known grades can be had under that figure. Forging billets are quoted at \$31 to \$32, Eastern mill, dependent on specifications, the usual extras applying for high carbons and special sizes.

**Plates.**—Mills report a fair run of miscellaneous business, the aggregate tonnage of which has been close to the average. Somewhat greater competition for orders is noted, and it is reported that price concessions have been made by some producers for desirable specifications. Eastern mills are, as a rule, operating at less than full capacity and can make prompt shipments. In some instances consumers show a desire to contract for requirements during the last half; few producers are willing, however, to enter orders for shipments beyond the third quarter. Open quotations for ordinary plates delivered in this territory are maintained at 1.70c., minimum.

**Structural Material.**—No large contracts have been reported by mills or fabricators, current business being largely of a miscellaneous character. Several good sized building propositions and some bridge work are being figured on, but these develop into orders rather slowly. Prompt deliveries are to be had on the general run of plain shapes. Quotations are unchanged, 1.60c. to 1.65c., delivered in this territory, ruling for ordinary plain shapes.

**Sheets.**—The demand has developed some irregularity, but orders taken reach a very satisfactory total. Mills are fully occupied and on some sizes and grades still find it difficult to meet customers' demands for delivery. Prices are firmly maintained, the following range being named for reasonably early delivery. Nos. 18 to 20, 2.80c.; Nos. 22 to 24, 2.90c.; Nos. 25 and 26, 3c.; No. 27, 3.10c.; No. 28, 3.20c.

**Bars.**—Refined iron bars have been in less active demand and prices are not being as firmly maintained. Orders are principally for small lots for prompt shipment, for which quotations ranging from 1.50c. to 1.55c. are named for ordinary bars, delivered in this vicinity. The demand for steel bars continues active, and prices are comparatively firm at 1.60c., delivered, but shipments inside of six weeks are hard to obtain.

**Coke.**—The market has been quieter. While there has been some inquiry for foundry coke for second half shipment, contracts are not being freely placed, the bulk of the business being in small lots at prices ranging from \$2.25 to \$2.50, at oven. The movement in furnace coke has been less active, sellers holding close around \$1.75 at oven, for second half shipments. The following range of prices, per net ton, is being named for deliveries in buyers' yards in this vicinity:

Connellsville furnace coke.....	\$4.00 to \$4.15
Foundry coke.....	4.50 to 4.75
Mountain furnace coke.....	3.60 to 3.75
Foundry coke.....	4.10 to 4.35

**Old Material.**—A somewhat better tone prevails, although the market is quiet, pending the outcome of bids on the usual monthly railroad lists. Some consumers of heavy melting steel, stove plate, borings and turnings are showing more interest in the market, although transactions have so far been unimportant. Report has it that some of the rolling mills in this district will follow the plan of the steel mills and arrange to buy their supplies of old material through a central agent, but this lacks confirmation. One of the associated steel mills has, it is stated, returned to the plan of buying its old materials, except steel scrap, through its own purchasing department. Quotations remain nominal to a large extent, those representing about the range at which business could be done, for delivery in buyers' yards in this district, being named as follows:

No. 1 steel scrap and crops.....	\$14.50 to \$15.00
Old steel rails, rerolling.....	16.50 to 17.00
Low phosphorus.....	20.50 to 21.00
Old steel axles.....	20.50 to 21.50
Old iron axles.....	20.50 to 21.50
Old iron rails.....	20.00 to 20.50
Old car wheels.....	15.00 to 15.50
No. 1 railroad wrought.....	17.00 to 17.50
Wrought iron pipe.....	15.00 to 15.50
No. 1 forge fire.....	12.50 to 13.00
No. 2 light iron.....	8.50 to 9.00
Wrought turnings.....	9.50 to 10.00
Cast borings.....	8.50 to 9.00
Machinery cast.....	15.00 to 15.50
Railroad malleable.....	14.50 to 15.00
Grate bars.....	12.50 to 13.00
Stove plate.....	10.00 to 10.50

## Cleveland

CLEVELAND, OHIO, June 7, 1910.

**Iron Ore.**—May shipments down the lakes were 6,081,355 gross tons, as compared with 3,253,275 tons in May, 1909. The total movement this season up to June 1 was 7,601,685 tons, against 3,309,068 tons in the same time last year. The shipments during May broke all previous records for that month. The demand from furnaces shows little improvement and a large share of the tonnage that is coming down the lakes is still being placed on the dock piles. No sales or inquiries are reported. Prices remain firm. We quote as follows, per gross ton: Old Range Bessemer, \$5; Mesaba Bessemer, \$4.75; Old Range non-Bessemer, \$4.20; Mesaba non-Bessemer, \$4.



# THE IRON AND METAL MARKETS

**Pig Iron.**—While not many sales are reported, the market shows considerable improvement. Some business has resulted from the good volume of inquiries for foundry iron that set in about 10 days ago. Other deals are pending and are likely to be closed at any time. The largest sale reported is 3000 tons, half foundry and half malleable, to a local manufacturer who had an inquiry out several weeks ago, but who has been holding off. A portion of the foundry iron went to a local furnace at \$15.75 for No. 2, for the last half, and the remainder, both foundry and malleable, to outside furnaces at about \$15, at furnace. A local furnace-maker has bought 1000 tons of No. 2 foundry and 500 tons of No. 1 Southern for the last half. Other sales reported in northern Ohio include 2000 tons of malleable, 1000 tons of basic and 1000 tons of Northern foundry. The Barberton, Ohio, plant, reported in the market last week for 5000 tons of analysis iron for the last half, has not yet bought. A Battle Creek, Mich., implement maker is in the market for 3000 tons of foundry iron for the last half, and a number of other new inquiries for lots of 500 tons and under have come out. While foundry iron remains firm at \$15, Valley furnace, for No. 2 for the last half delivery, with a few sellers holding for \$15.25, the former price is now being shaded to \$14.75 for spot shipment, and there are rumors of No. 2 being offered as low as \$14.50 for immediate delivery. The Southern market is firm, at \$12, Birmingham, for No. 2, for the last half and \$11.75 for spot shipment. Several sales of small lots are reported at those prices. Ella Furnace of Pickands, Mather & Co. will go out of blast this week. For prompt shipment and last half we quote, delivered, Cleveland, as follows:

Bessemer .....	\$16.90 to \$17.15
Northern foundry, No. 1.....	16.25 to 16.50
Northern foundry, No. 2.....	15.65 to 15.90
Northern foundry, No. 3.....	15.25 to 15.50
Gray forge.....	15.40 to 15.65
Southern foundry, No. 2.....	16.10 to 16.35
Jackson Co. silvery, 8 per cent. silicon.	20.50 to 21.00

**Coke.**—A local furnace interest has bought 50,000 tons of furnace coke for the last half delivery, and is in the market for 100,000 tons additional. The demand for foundry coke is very light. We quote standard Connellsville furnace coke at \$1.55 to \$1.70 per net ton, at oven, for spot shipment, and \$1.75 to \$1.85 for the last half. Connellsville 72-hour foundry coke is held at \$2.15 to \$2.30 for spot shipment and \$2.25 to \$2.50 on contract.

**Old Material.**—The market has quieted down again and the outlook is less satisfactory. Prices which were thought to be at the bottom have taken another drop of about 50c. a ton on several grades. As noted last week, considerable activity developed among yard dealers who came in the market for scrap to put in stock to hold for better prices. This buying has about ceased, and those dealers who are now willing to buy scrap for speculation are offering lower prices than were being paid a week ago. The demand from the mills continues very light and no improvement is looked for soon. Dealers' prices, per gross ton, f.o.b. Cleveland, are as follows:

Old steel rails.....	\$15.50 to \$16.00
Old iron rails.....	17.00 to 17.50
Steel car axles.....	21.00 to 21.50
Heavy melting steel.....	13.75 to 14.25
Old car wheels.....	14.00 to 14.50
Relaying rails, 50 lb. and over.....	22.50 to 23.50
Agricultural malleable.....	12.00 to 12.50
Railroad malleable.....	13.50 to 14.00
Light bundled sheet scrap.....	9.75 to 10.25

The following prices are per net ton, f.o.b. Cleveland:

Iron car axles.....	\$21.50 to \$22.00
Cast borings.....	6.50 to 7.00
Iron and steel turnings and drillings...	7.25 to 7.75
Steel axle turnings.....	10.00 to 10.50
No. 1 busheling.....	12.00 to 12.50
No. 1 railroad wrought.....	14.00 to 14.50
No. 1 cast.....	12.50 to 13.00
Stove plate.....	11.00 to 11.50
Bundled tin scrap.....	11.00 to 11.50

**Finished Iron and Steel.**—The agreement reached between the President and the Western railroads quickly resulted in a better feeling. The demand for steel bars continues quite active, and several contracts for round tonnages were closed during the week. A considerable portion of this tonnage was in three months' contracts with consumers outside of the implement trade. Steel bars remain firm at 1.45c., Pittsburgh. Aside from steel bars the demand is not heavy and specifications appear to be below the capacity of the mills. In structural material there is a fair demand for small lots from fabricators, but much of the local work requiring large tonnages is being held up. The Nickel Plate Railroad has awarded the contract for six bridges in East Cleveland in connection with track elevation work to the King Bridge Company. These will require 1900 tons of steel. The bridge company has not placed the contract for this structural material, and is expected to buy in the open market in an effort to secure price concessions. While 1.50c., Pittsburgh, is being quoted on plain material in this

territory, this quotation is not general and mills are getting 1.55c. for small lots. The demand for plates is rather light and prices are not firm. The larger mills are generally adhering to the price of 1.50c., Pittsburgh, but more of the smaller mills are understood to be making the 1.45c. quotation. The demand for sheets is only moderate and the usual concessions of \$2 to \$3 a ton on black and galvanized continue. The demand for shafting continues good. Some new contracts are reported for future delivery. The demand for light rails is quite active. Mills are meeting with more competition than for some time from makers of rerolled rails, who are cutting prices. There is some demand for forging billets which are being sold in car lots for prompt shipment at \$32, Pittsburgh. The demand for iron bars continues light and prices are not firm. We quote iron bars at 1.45c. to 1.50c., Cleveland. Warehouse business with jobbers continues heavy in nearly all lines.

## Cincinnati

CINCINNATI, OHIO, June 8, 1910.

More evidences of firmness in the Southern iron market are furnished in the exchange of correspondence. Southern iron is more nearly a \$12, Birmingham, basis to-day than for several weeks. Coke presents a stronger front. Buyers and sellers are closer together in both iron and coke, and the near future promises to see some good contracting for last half and last quarter needs. In finished material there has been a good volume of business, particularly in steel bars. Old material is weaker.

**Pig Iron.**—Melters are still feeling the market for \$11 or \$11.50 iron, but Southern makers appear now to be more nearly unanimous on the \$12, Birmingham, minimum than for several weeks. So much may not be said of the Northern product as makers in southern Ohio territory are still considering offers approximating \$15, Ironton, for the entire last half. Valley irons that can get in southern Ohio territory are offering strong competition. Low grades continue scarce, and the prices of Nos. 3 and 4 foundry and forge do not vary greatly, No. 4 foundry or forge being hardly obtainable at less than \$11.25 and \$11, Birmingham, respectively. The close of last week saw some good sized contracts made on the \$11.50 basis, but these same sellers this week are disposed to limit deliveries to immediate shipment on this basis. The 5000 ton inquiry of last week from a northern Ohio boiler making interest is said to be still in abeyance, with probabilities of going to a Valley furnace. An inquiry for 2000 tons of foundry iron, Northern and Southern, for last half, comes from central Ohio, and another for 1000 tons for June shipment south of the Ohio River. An Indiana stove maker is reported to have bought 500 tons, largely Northern, at less than \$15, Ironton, for last half delivery. Another Indiana melter has bought 300 tons of standard Birmingham No. 2 foundry iron for delivery through July, August, September and October at \$12, Birmingham. Some silvery iron is wanted in Chicago territory. The price is nominally \$18.50, at furnace, for 8 per cent., but it is persistently rumored that this price is shaded for tonnages of any size. Some ferrosilicon has been sold at \$60 for 50 per cent. Hanging Rock Furnace of Rogers, Brown & Co. will blow out about July 1 for minor repairs and will probably remain out until the market assumes a more substantial appearance. Iron Gate Furnace of the Oriskany Iron & Steel Company will blow out July 1; Buena Vista Furnace of the same company blew in June 5. For immediate delivery and through the last half of the year, based on freight rates of \$3.25 from Birmingham and \$1.20 from the Hanging Rock district, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 foundry.....	\$15.50 to \$15.75
Southern coke, No. 2 foundry.....	15.00 to 15.25
Southern coke, No. 3 foundry.....	14.75 to 15.00
Southern coke, No. 4 foundry.....	14.50
Southern coke, No. 1 soft.....	15.50 to 15.75
Southern coke, No. 2 soft.....	15.00 to 15.25
Southern gray forge.....	14.25
Ohio silvery, 8 per cent. silicon.....	19.70
Lake Superior coke, No. 1.....	16.70 to 17.20
Lake Superior coke, No. 2.....	16.20 to 16.70
Lake Superior coke, No. 3.....	15.70 to 16.20
Standard Southern car wheel.....	25.25 to 25.75
Lake Superior car wheel.....	22.25 to 22.75

(By Mail.)

**Coke.**—There is considerable talk of mergers in the Connellsville region, but no official report has been received by selling agencies interested here. At the Cincinnati office of Matthew Addy & Co. encouraging reports are made of sales in both furnace and foundry grades. Rogers, Brown & Co. have made some excellent sales in the East. Some accumulations on track are noted and spot coke is accordingly a little easier, but contracting is on a little stiffer basis. Connellsville furnace grades are contracted on an average basis of \$1.75 per net ton at oven; foundry brands are quotable at \$2.25 to \$2.50, some spot coke being obtainable at possi-

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bly 5 to 10 cents less. Pocahontas furnace coke is a trifle more active, some hurry delivery orders going into Virginia; the price ranges from \$1.75 to \$1.90 per net ton at oven and on contract from \$1.90 to \$2.10. Pocahontas foundry is quotable at \$2.25 to \$2.35 for prompt delivery, although some contracts have recently been made based on a \$2.50 price, which also about represents the range on forward delivery coke. Wise County grades range about the same.

**Finished Iron and Steel.**—The market is quiet. Mill shipments have fallen off, but warehouse business continues excellent. Steel bars are still quotable on the basis of 1.45c., Pittsburgh, and out of stock 1.90c.; structural shapes and plates, 1.50c. to 1.55c.; price of both out of stock, 2c. It is generally understood that all large interests are accepting what they term desirable business at these prices for delivery up to the first of the year. The backward weather has affected business in sheets entering into gas stove construction and the like. These concerns are buying conservatively and carefully, and few are covering further than October 1. Some shading is reported on boiler tubes. Iron bars are weak, and 1.55c. Cincinnati mill, is easily done in carload lots. There is little demand for structural material aside from twisted steel bars that enter into reinforced concrete construction, of which there is considerable here.

**Old Material.**—The market is rather more demoralized than at any previous time this year, and some sellers announce reductions of \$1 to \$2, and report purchases of material, such as borings, turnings, melting steel and wrought, at exceedingly low prices; for instance, borings at \$3.50, turnings at \$5, &c. The larger dealers expect the market to go still lower. Mills are reported to be canceling orders. The firmest item in the list is relayers, which are held at \$22 to \$23. In the absence of buying, and as nearly as can be determined from the situation here, we quote dealers' prices, delivered buyers' yards, Cincinnati and southern Ohio, as follows:

No. 1 railroad wrought, net ton.....	\$11.00 to \$12.00
Cast borings, net ton.....	4.00 to 5.00
Heavy melting steel scrap, gross ton...	11.00 to 12.00
Steel turnings, net ton.....	6.00 to 7.00
No. 1 cast scrap, net ton.....	11.00 to 12.00
Burnt scrap, net ton.....	8.00 to 9.00
Old iron axles, net ton.....	16.00 to 17.00
Old iron rails, gross ton.....	17.00 to 17.50
Old steel rails, short, gross ton.....	15.00 to 15.50
Old steel rails, long, gross ton.....	15.00 to 15.50
Relaying rails, 56 lb. and up, gross ton.	22.00 to 23.00
Old car wheels, gross ton.....	13.00 to 13.50
Low phosphorus scrap, gross ton.....	16.00 to 16.50

The Cincinnati office of the Whitney Kemmerer Company has contracted with Robert Vaughn, receiver of the Bon Air Coal & Iron Company, for a six months' supply of coke, 4500 tons per month, deliveries to begin July 1. The contract is a combination one, the flat price approximating \$1.90 per net ton at oven. The friendly receivership inaugurated recently for control of the Bon Air Company is expected to place the property soon on a paying basis and enable its contemplated expansion. The furnace is making high silicon and high phosphorus pig iron.

### Buffalo

BUFFALO, N. Y., June 7, 1910.

**Pig Iron.**—The week has been quieter as to inquiry and less productive of new business than the preceding two weeks, although there has been a fairly good run of orders from 100 to 500 tons, foundry grades, for prompt and third-quarter delivery. These orders are coming in without special solicitation, as producers are not urging placements in view of the large tonnages recently booked, and the fact that there is no incentive to secure trade with prices at their present unattractive level. The feeling among furnacemen is that prices must stiffen before an effort is made to sell, and the general opinion is that a period of improvement and firmer prices is near. We quote as follows for current and last half delivery, per gross ton, f.o.b. Buffalo, or at furnace:

No. 1 X foundry.....	\$16.00 to \$16.50
No. 2 X foundry.....	15.50 to 16.00
No. 2 plain.....	15.25 to 15.75
No. 3 foundry.....	15.00 to 15.50
Gray forge.....	15.00 to 15.50
Malleable.....	15.75 to 16.25
Basic.....	15.50 to 16.00
Charcoal.....	19.25 to 19.75

**Finished Iron and Steel.**—One of the leading local agencies reports the closing of contracts for about 4000 tons of steel bars at current prices, and a number of inquiries for good sized tonnages of bar material which had been held up pending the outcome of the railroad controversy are again in the market. A good demand for plates and shapes is also reported. There is pronounced activity in the Canadian ex-

port market, one interest reporting the closing of several contracts for bar material during the week—one for 1000 tons and others of smaller tonnage—with inquiries for several thousand tons of bars and other material pending. Steel bar prices remain at 1.50c., Pittsburgh, for the general run of current and small orders, with 1.45c. named for large and desirable tonnages. In structural lines more activity is observable than for some time, with prices fairly well maintained at 1.55c., Pittsburgh, although some of the smaller interests are reported as having shaded slightly in figuring desirable contracts. Bids will be received this week for the steel for the Clinton street public market building, Buffalo, about 150 tons, and on June 14 for steel for the New York Central Railroad Company's warehouse at Ohio street and the Buffalo River, 350 tons. The Buffalo Structural Steel Company has been awarded contract for the fabrication and erection of the steel for the Auditorium Theatre, Rochester, 200 tons, and the Lackawanna Bridge Company for the steel for the New York Central car shops at Oswego, 100 tons. The Turner Construction Company has commenced work on the reinforced concrete buildings of the new plant of the Hooker Electro-Chemical Company, Niagara Falls, to replace the plant recently destroyed by fire, which will require several hundred tons of reinforcing bars.

**Old Material.**—The demand from consumers continues light. Prices are nominally unchanged. We quote as follows, per gross ton, f.o.b. Buffalo:

Heavy melting steel.....	\$13.50 to \$14.00
Low phosphorus steel.....	18.50 to 19.00
No. 1 railroad wrought.....	15.50 to 16.00
No. 1 railroad and machinery cast scrap.	14.50 to 15.00
Old steel axles.....	18.00 to 18.50
Old iron axles.....	22.75 to 23.25
Old car wheels.....	15.00 to 15.50
Railroad malleable.....	15.00 to 15.50
Boiler plate.....	12.00 to 12.50
Locomotive grate bars.....	11.50 to 12.00
Pipe.....	11.50 to 12.00
Wrought iron and soft steel turnings..	7.25 to 7.75
Clean cast borings.....	6.00 to 6.50
No. 1 bushing scrap.....	12.50 to 13.00

### Birmingham

BIRMINGHAM, ALA., June 6, 1910.

**Pig Iron.**—The bulk of the trading the past week was confined to small lots. Inquiries were fairly good, and it would seem that the smaller buyers of the country have come to the conclusion that it is about time to look into the matter of caring for their future needs in the way of raw material. It is well known that our largest buyers have pretty thoroughly covered their needs reasonably far ahead. This was mostly done in a very quiet way, and it has furnished "food for thought" for the smaller consumers. There has been some decrease in stocks, and as it was about the middle of May before production was curtailed to any appreciable extent, the month of June should not only show several thousand tons less in the local production, but a material decrease in stocks on merchant furnace yards. Some of the furnace interests are not only strongly adhering to the \$12 price, but are asking \$12.50 for last quarter delivery. The manager of sales of one of the largest producers of pig iron in this district states that his company has decided to pursue the policy of not selling ahead more than 50 per cent. of the estimated make of any one grade, which policy would put it in position to take advantage of favorable spot market conditions from time to time. On the whole, the tone of the market is much better than it has been for several months, and while considerable trading has been of the "gum shoe" nature, it is understood that the furnace interests feel quite comfortable, hence they are in position to "sit steady in the boat" again for a while. There has been some \$11.50 iron booked in the past week or so, but the bulk of it was for shipment from the Sheffield and Chattanooga districts, where there is not only an advantage in freight concession, but the iron is a little high in phosphorus, thereby naturally bearing at least a 25c. per ton concession below the price of regular standard Alabama iron. The Southern charcoal iron market is reported exceedingly firm at from \$22 to \$22.50, at the furnace; inquiries and sales are comparatively good.

**Cast Iron Pipe.**—A canvass of local conditions in the water pipe market reveals the fact that, while no lettings occurred the past week of special mention, the general business transacted was of a very satisfactory nature. Local manufacturers say they have orders on their books to run them several months, with new small business coming up from time to time. Authorized quotations on water pipe are as follows, per net ton, f.o.b. cars here: 4 to 6 in., \$23; 8 to 12 in., \$22; over 12 in., average \$21, with \$1 per ton extra for gas pipe.

**Old Material.**—Some little better feeling exists in the scrap market, due probably to the fact that buyers feel that they can afford to take advantage of the low level of present



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prices. There is a better demand for steel scrap. Dealers make the following nominal quotations, per gross ton, f.o.b. cars here:

Old iron axes.....	\$17.00 to \$17.50
Old iron rails.....	13.00 to 13.50
Old steel axes.....	16.50 to 17.00
No. 1 railroad wrought.....	12.00 to 12.50
No. 2 railroad wrought.....	9.50 to 10.00
No. 1 country wrought.....	9.00 to 9.50
No. 2 country wrought.....	8.50 to 9.00
No. 1 machinery.....	10.50 to 11.00
No. 1 steel.....	9.50 to 10.00
Tram car wheels.....	10.00 to 10.50
Standard car wheels.....	11.50 to 12.00
Light cast and stove plate.....	7.50 to 8.00

The officials of the Sloss-Sheffield Steel & Iron Company set aside June 5 as a day of rejoicing at the reclamation of the No. 2 red ore mine near Bessemer, Ala. This mine is the mainstay of the company. President J. C. Maben pulled the cord that blew the whistle proclaiming the reopening of the mine after a shutdown and "drown out" of several months. At one time it looked as though the mine would be lost on account of the stubborn stream that broke through.

### The German Iron Market

BERLIN, May 26, 1910.

The iron trade remains very quiet. In most departments of the trade it is reported that buying is at a low ebb, consumers being disposed, as far as possible, to wait and watch the further development of business before entering upon large engagements. Prices have hardly changed in the home market during the past fortnight, but whatever changes occurred were downward, not upward. Bars appear to be the weakest section of the market. One of the great Westphalian mills, which refused to join in the bar convention of last fall, has been underselling the latter. While the convention price is 110 to 112 marks, the mill in question is selling at 107 to 108; and dealers are also continuing to compete with the convention by easier offers. Under the circumstances it is doubted whether the convention will be able to maintain its existing prices. It will hold a meeting in a day or two and it is believed that it will be forced to reduce prices.

### The Export Drawback Increased

Another sign of the less favorable position of the market may be seen in the action of the Steel Syndicate, undertaken several days ago in respect to the drawback allowed upon exported finished products. In view of the rapid improvement in the home and foreign markets last fall the syndicate decided at that time to reduce the drawback—hitherto 15 marks a ton on the semimanufactured steel used—to 10 marks. This reduction was to take effect at the beginning of April. Already, however, the manufacturers of finished products have been able to convince the syndicate that they cannot hold their position in foreign markets under the reduced drawback, and last week it was voted to restore the drawback to 15 marks. It is understood that the argument used by exporters with such good effect was the changed position of the world's markets, especially the sharper competition of outside producers and the cutting of prices on their part.

### Struggling for the English Market

German and Belgian manufacturers are engaged in a keen struggle for the English market. For some days news has been arriving from Brussels indicating that manufacturers are cutting prices for export, and one cut follows another with remarkable frequency. Last week Belgian works reduced the export price of all forms of semimanufactured steel in order to meet German competition. Ingots were reduced to 84 shillings, free on board at Antwerp; blooms to 86 and muck bars to 89 and 90 shillings. This meant a cut of 2 shillings all round. According to a dispatch from Brussels to-day, the price of steel bars has just been reduced 2 shillings and 2 shillings 6 pence and wrought iron bars 1 shilling, all free on board at Antwerp. The new prices are £4 18s. to £5 per ton for steel bars and £4 17s. to £4 19s. for wrought iron bars.

The Steel Syndicate gave out its usual monthly report several days ago, hardly showing any change in the situation. It says that in Great Britain, the chief market for German producers, an undertone of confidence prevails, but it is admitted that new orders are effected at a somewhat slower pace. The export trade in heavy rails remains satisfactory, and rails for mining purposes continue to be bought briskly. In grooved rails the mills are fully occupied and many of them find it difficult to deliver on time. The home trade in structural shapes had not been affected in April by the great lockout in the building trade,

but a shrinkage of business is expected later. The export trade goods remains at the usual level.

There is no indication of a prospective curtailment of production of pig iron and orders for ores are on the usual scale. Foreign ore prices are still firm for nearly all kinds. Swedish ores remain scarce. In Spanish ores a quieter tendency is reported. The only class of ores on which lower prices are reported are Russian manganese ores, and the reduction is attributed to the slacker exports to the United States.

Germany's iron exports in April reached record figures. March had established a new record with exports of 410,000 metric tons, but the April movement was nearly 437,000 tons, comparing with only 316,500 tons in April, 1909.

### St. Louis

ST. LOUIS, June 6, 1910.

**Coke.**—With but one exception, the leading brokers report a quiet market the past week. In the case noted, two sales were made to the same company of Virginia foundry (one of 3500 tons and another of 1500 tons) for shipment over the second half of 1910. Speaking generally, brokers find large consumers holding off, awaiting such developments as may transpire between now and July 1, the time at which many companies are in the habit of contracting for forward delivery. We quote the market unchanged at \$2.35 for prompt and \$2.50 for yearly contract on 72-hour standard brands of Connellsville per net ton, f.o.b. furnace.

**Pig Iron.**—The largest transaction the past week was the purchase of 10,000 tons of basic by a local steel foundry of a Southern company for shipment over the last half. Other sales reported, mostly Southern foundry, aggregate in two offices about 1000 tons each and in a third about 1200 tons. There is considerable inquiry. One house reports four inquiries by large local foundries being withdrawn on account of the recent railroad rate injunction, and states that at the close of the week an offer for iron was accepted by a Southern furnace that had been declined earlier. This action on the part of the producer is also attributed to the same cause. Coming as it did at a time when some improvement in the demand and a hardening of prices were evident, is a matter of discouragement to the representatives of iron producing interests. We continue our quotations of \$12 for No. 2 Southern foundry, f.o.b. Birmingham, shipment over the second half, for standard quality, with reports of \$11.50 being accepted for prompt shipment. Southern Ohio is held at \$15, f.o.b. furnace.

**Lead, Spelter, Etc.**—Lead is quiet at 4.20c. to 4.25c. Spelter is dull at 5.10c. to 5.15c., East St. Louis. Zinc ore is held at \$42 per ton, Joplin base. Tin is off 20c. per 100 lb.; antimony is held at previous prices for all grades; copper is unchanged. The demand for finished metals continues good.

**Old Material.**—Conditions controlling the pig iron market are reflected in the business in scrap iron and steel, with, however, more emphasis, since there is no improvement in the demand; notwithstanding this, prices are firmly held. The Wabash Railroad is out with offerings aggregating 950 tons, and the St. Louis & San Francisco also has a miscellaneous list of 750 tons. Our quotations show one or two changes from last week. We quote dealers' prices as follows, per gross ton, f.o.b. St. Louis:

Old iron rails.....	\$15.00 to \$15.50
Old steel rails, re-rolling.....	15.00 to 15.50
Old steel rails, less than 3 ft.....	13.50 to 14.00
Relaying rails, standard sections, subject to inspection.....	26.00 to 26.50
Old car wheels.....	15.00 to 15.50
Heavy melting steel scrap.....	13.50 to 14.00
Frogs, switches and guards, cut apart.....	13.50 to 14.00

The following quotations are per net ton:

Iron fish plates.....	\$14.00 to \$14.50
Iron car axles.....	21.00 to 21.50
Steel car axles.....	19.50 to 20.00
No. 1 railroad wrought.....	13.50 to 14.00
No. 2 railroad wrought.....	12.50 to 13.00
Railway springs.....	12.00 to 12.50
Locomotive tires, smooth.....	16.50 to 17.00
No. 1 dealers' forge.....	11.00 to 11.50
Mixed borings.....	6.50 to 7.00
No. 1 busheling.....	11.50 to 12.00
No. 1 boilers, cut to sheets and rings.....	9.50 to 10.00
No. 1 cast scrap.....	12.50 to 13.00
Stove plate and light cast scrap.....	9.50 to 10.00
Railroad malleable.....	11.25 to 11.75
Agricultural malleable.....	10.00 to 10.50
Pipes and flues.....	9.25 to 9.75
Railroad sheet and tank scrap.....	8.50 to 9.00
Railroad grate bars.....	9.50 to 10.00
Machine shop turnings.....	9.50 to 10.00

The Lee Line of Memphis, Tenn., will begin at once the construction at Memphis of a new steel hull steamboat that will cost upward of \$125,000, for the Memphis & St. Louis trade.

The Automatic Register Company, Dover, Del., will in-

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stall a large plant at East St. Louis for the manufacture of registers, which will furnish employment for several hundred skilled mechanics.

Kansas City is within \$125,000 of the \$1,000,000 necessary to be raised to improve the harbor and establish a steamboat line between that city and St. Louis.

### New York

NEW YORK, June 8, 1910.

**Pig Iron.**—Additional purchases of 3000 or 4000 tons for the foundry of a boiler manufacturer in New Jersey have been made this week. Several sales of 500 to 1000 tons are reported also, to a variety of foundries, but generally business is lighter than in the preceding two weeks. Eastern Pennsylvania furnaces for the most part are not meeting the extremely low prices that have been quoted in competitive districts, but while \$15.75, at furnace, is minimum with some of them, early delivery sales have been made at \$15.50 for No. 2 X. As more and more contracts have been closed involving deliveries in the second half, there is the feeling on the part of producers that too much of their capacity late in the year should not be taken up at prices leaving no profit. Stocks in eastern Pennsylvania showed a relatively small increase in May. We quote Northern iron, at tidewater, for delivery in the third quarter, as follows: No. 1, \$17 to \$17.25; No. 2 X, \$16.50 to \$16.75; No. 2 plain, \$16.25 to \$16.50. On Southern iron we quote \$16.50 to \$16.75 for No. 1 and \$16 to \$16.25 for No. 2.

**Steel Rails.**—For construction work in Texas the Pennsylvania Steel Company has sold 5700 tons to the contracting firm of Stone & Webster. A sale of 600 tons has been made to a Connecticut trolley line and one of the same amount to a Denver traction company. The Illinois Steel Company sold 4000 tons of Bessemer rails last week and 24,000 tons of open hearth. The latter amount includes a 19,000-ton lot to one road. From Pittsburgh 800 tons was sold to the Southwestern New York Traction Company and 500 tons to the New Orleans Railway & Light Company.

**Ferroalloys.**—There have been some very good purchases of ferromanganese in this market during the week, and inquiries are out for some fair-sized quantities. Ferromanganese is being quoted at \$40, seaboard, for this year's delivery. The demand for ferrosilicon is light. Holders of foreign ferrosilicon declare they will not meet the price of the domestic product, which they say is below the cost of importation. New York houses quote the market at \$59, Pittsburgh. A western Pennsylvania steel company is inquiring for 15,000 tons of spiegeleisen.

**Finished Iron and Steel.**—All lines of finished iron and steel experienced a comparatively dull week in this vicinity, which, however, was not unseasonable. Structural business was very quiet, the plate trade satisfactory but not very active, bar iron business only fair and steel bars slow so far as new business is concerned. Makers of the latter, particularly, and all lines in general, have a good tonnage on their books, so that there is little concern over the situation. The structural mills are most in need of additional orders to keep them running near their capacity, and have been taking most of their business lately from other sections; the activity is all in the West and Middle West. The only contract closed in New York for a mentionable amount was that for a loft building on West Thirty-fifth street, 600 tons, taken by the Hay Foundry & Iron Works. The foundry building for the General Electric Company at Erie, Pa., has been awarded the American Bridge Company, and will require 2500 tons. This company also got the addition to the Dupont Building, 1300 tons, in Wilmington, Del., and a theater in Seattle, of 500 tons. Two contracts in Boston were taken by the New England Structural Company, the Lawrence Building, 1100 tons, and the foundation for the United States Custom House, 400 tons. The smelter plant for the Chino Copper Company, 2500 tons, was awarded the Minneapolis Steel & Machinery Company. A building for the Solvay Process Company in Detroit, which will take 1050 tons, was given the Phoenix Iron Company. Two automobile factories in the same city have been contracted for, one for the Lozier Motor Company, 400 tons, and one for the Ford Motor Company, 600 tons. A few additional railroad bridge awards have been made. The Toledo-Massillon Bridge Company obtained 500 tons from the Toledo & Ohio Central, the King Bridge Company 1900 tons from the Nickel Plate, the American Bridge Company 250 tons from the Boston & Maine, and the Central New England Railway placed several small bridges aggregating 250 tons. Plain structural material and plates are quoted at 1.66c., New York, steel bars at 1.61c., and bar iron at 1.50c. to 1.55c.

**Cast Iron Pipe.**—Business is quiet. Quotations are continued at \$25.50 to \$26 per net ton, tidewater, for car-load lots of 6 in.

**Old Material.**—Railroad lists out for this month are

rather heavy, some companies offering considerably more than usual. Dealers are waiting with much interest the results realized on these offerings. The New York Central is now wrecking its Grand Central Depot for the purpose of building a larger structure, and it is expected that at least 25,000 tons of iron and steel scrap will come on the market from that source. The cargo of Panama scrap which arrived here last week, and was sold at public sale Monday, brought \$10.20. The general demand is light. Foundries are buying cautiously, taking small lots to cover their immediate requirements, but making no commitments for future delivery. Rolling mills are purchasing when prices are made attractive, but not otherwise. About the only transactions in steel scrap are purchases by dealers to apply on old contracts. Quotations per gross ton, New York and vicinity, are continued as follows:

Rerolling rails.....	\$12.50 to \$13.00
Old girder and T rails for melting.....	12.00 to 12.50
Heavy melting steel scrap.....	12.00 to 12.50
Relaying rails.....	20.00 to 21.00
Standard hammered iron car axles.....	22.50 to 23.00
Old steel car axles.....	18.00 to 18.50
No. 1 railroad wrought.....	14.00 to 14.50
Wrought iron track scrap.....	12.50 to 13.00
No. 1 yard wrought, long.....	12.50 to 13.00
No. 1 yard wrought, short.....	12.00 to 12.50
Light iron.....	6.00 to 6.50
Cast borings.....	7.00 to 7.50
Wrought turnings.....	8.00 to 8.50
Wrought pipe.....	12.00 to 12.50
Old car wheels.....	12.50 to 13.00
No. 1 heavy cast, broken up.....	12.50 to 13.00
Stove plate.....	9.50 to 10.00
Locomotive grate bars.....	9.50 to 10.00
Malleable cast.....	12.00 to 12.50

### Metal Market

NEW YORK, June 8, 1910.

#### THE WEEK'S PRICES

		Copper.....		Cents Per Pound.		Lead.....		Spelter.....	
		Lake.	Electro-lytic.	Tin.		New York.	St. Louis.	New York.	St. Louis.
June.	2.....	13.00	12.75	32.80		4.37½	4.22½	5.30	5.15
	3.....	13.00	12.75	32.80		4.37½	4.22½	5.30	5.15
	4.....	13.00	12.75	32.85		4.37½	4.22½	5.25	5.10
	6.....	13.00	12.75	32.90		4.37½	4.22½	5.15	5.00
	7.....	13.00	12.75	32.95		4.37½	4.22½	5.15	5.00
	8.....	13.00	12.75	32.85		4.37½	4.22½	5.15	5.00

More encouraging conditions exist in the metal market. There has been an excellent buying movement in pig tin and lead is in better demand. Spelter has fallen off in price and the copper market has been quiet.

**Copper.**—The copper market has been marking time, as both sellers and consumers have been holding off pending the report of the Copper Producers' Association. Prices have been stationary all the week, although there were reports of offers to shade prices. These offers came largely from holders of outside lots who were anxious to get rid of some heavy accumulations, but, as consumers were not disposed to buy, transactions were few. We quote lake copper at 13c. and electrolytic at 12.75c. In a few instances sales of outside lots were made on which these prices were shaded from 5 to 7 points. The exports so far this month have been light, amounting in all to 2792 tons. L. Vogelstein & Co. give the following figures of this year's German consumption of foreign copper to the close of April: Imports, 57,322 tons; exports, 2658 tons; consumption, 54,664 tons, as compared with consumption during the same period of 1909 of 46,619 tons. Of this quantity, 50,784 tons was imported from the United States. Spot copper was sold in London to-day for £56 7s. 6d., and futures for £57 2s. 6d. The sales were 300 tons of spot and 700 tons of futures.

**Pig Tin.**—There have been some heavy sales of pig tin during the last few days, and for the first time in many weeks there was considerable trading on Saturday. The leading consumer came into the market on Friday and openly bought large quantities. On that day the price advanced from 32.80c. to 32.85c. When the market closed on Friday afternoon there were indications that the purchasers had not filled their requirements and in consequence there was some sharp trading on Saturday, when the market went, in three successive raises of 5 points at a time, to 33c. On Saturday noon it was estimated that the buyer referred to had purchased fully 500 tons and there were reports that there would be further purchases this week. Monday morning the market opened at 33c., but it soon became known that the interest mentioned had filled its requirements for the time being and the market weakened. Other consumers, encouraged by the attitude of the large buyer, came into the market and the total sales of the week for all accounts amounted to fully 600 tons. Recent sales of tin and subsequent heavy purchasing are keeping the traders in a per-



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petual state of expectation and some uncertainty. The arrivals of pig tin so far this month are 1680 tons and there are 1535 tons afloat. In London to-day spot tin was sold for £148 17s. 6 d., and futures for £150 2s. 6d. The sales amounted to 200 tons of spot and 100 tons of futures. This afternoon pig tin was sold in New York for 32.85c.

**Lead.**—Lead has stiffened in price and there is a better demand for the metal. The long looked for buying movement from the contracting trade seems to have arrived, as there have been some good sized purchases of lead for pipe calking purposes. The American Smelting & Refining Company continues to hold its price at 4.40c., New York, for prompt delivery, and the outside sellers, encouraged by the buying movement, are gradually advancing their quotations toward that figure by withdrawing concessions and stiffening their quotations. Late last week outside lots could be bought in New York for 4.35c., but now the price in this market is 4.37½c., and it is very firm.

**Tin Plates.**—Tin plates continue in good supply and the quotation for 100-lb. coke plates is \$3.84. Advices from abroad go to show that the foreign tin plate market is very strong. Shipments are increasing and there is a good demand in this market for imported tin plates. The price at Swansea remains at 13s. 3d.

**Spelter.**—There was a sharp decline in spelter on Saturday, when the New York market dropped 10 points in the asking price, to 5.15c. Consumers show little inclination to buy, however, and this price is decidedly nominal, as even the reduction of ¼c. per pound by the sellers has failed to coax them into the market. There is so little spelter being carried in New York that those who have the metal on hand are asking ¾c. per pound over the cost of bringing spelter from the West. This is taken as an indication that the trade has ceased for the present to consider New York as a distributing point, as most of the inquiries made of late in this market are for spelter, f.o.b. cars at East St. Louis. The price for spelter for immediate delivery in New York in consequence does not represent the market, and as a matter of fact the jobbing trade is holding most of the stock and the jobbers would hardly be able to fill carload orders.

**Antimony.**—There have been a few inquiries in the market for antimony, but those making them seem to be very reluctant about placing orders. The market continues weak. Hallett's is 8½c. and Cookson's 8.37½c.

**Old Metals.**—Dullness prevails in this branch of trade. Dealers' selling prices are unchanged, as follows:

	Cents.
Copper, heavy cut and crucible.....	12.25 to 12.50
Copper, heavy and wire.....	12.00 to 12.25
Copper, light and bottoms.....	11.00 to 11.25
Brass, heavy.....	8.50 to 8.75
Brass, light.....	7.00 to 7.25
Heavy machine composition.....	11.50 to 11.75
Clean brass turnings.....	7.75 to 8.25
Composition turnings.....	9.75 to 10.00
Lead, heavy.....	4.05 to 4.20
Lead, tea.....	3.80 to 3.95
Zinc scrap.....	4.25 to 4.50

**May Copper Production and Stocks.**—Representatives of the Copper Producers' Association have compiled the figures for May as follows:

	Pounds.
Stock, May 1.....	141,984,160
Production in May.....	123,242,476
Domestic deliveries.....	59,365,222
Exports.....	45,495,440

Stock, June 1.....	104,800,662
	160,425,973

The increase in the stock is 18,441,813 lb., or about the same as the increase in April.

### Iron and Industrial Stocks

NEW YORK, June 8, 1910.

The heavy decline in prices of stocks noted last week continued persistently, with lower levels reached almost every day. The decline was not arrested until Tuesday morning of this week, when the effect was felt of an agreement made on Monday for the withdrawal of the railroad suits by the National Administration and of the notices by the railroad companies of advances in freight rates. The range of prices on active iron and industrial stocks from Thursday of last week to Tuesday of this week was as follows:

Allis-Chalm., com..	8 - 9½	Railway Spr., pref.....	100
Allis-Chalm., pref..	30 - 32½	Republic, com.....	27 - 31½
Beth. Steel, com..	25 - 26½	Republic, pref.....	90 - 96½
Can. com.....	9 - 9½	South. I. & S., pref.....	38
Can. pref.....	69½ - 71½	Sloss, com.....	66½ - 70½
Car & Fdry, com..	50½ - 58½	Pipe, com.....	19 - 21
Car & Fdry, pref..	113½ - 114	Pipe, pref.....	69½ - 71
Steel Foundries....	49½ - 53	U. S. Steel, com....	74½ - 79½
Colorado Fuel....	32½ - 36½	U. S. Steel, pref....	114½ - 117½
General Electric..	140 - 144½*	Westinghouse Elec.	59 - 62

Gr. N. ore cert....	57½ - 61½	Am. Ship, com....	79 - 82
Int. Harv., com....	93 - 98	Am. Ship, pref.....	110½
Int. Harv., pref....	121½ - 122	Chi. Pneu. Tool....	38 - 40
Int. Pump, com....	44½ - 45½	Cambria Steel....	44 - 46
Int. Pump, pref....	81½ - 82	Lake Sup. Corp....	21 - 22½
Locomotive, com....	40½ - 45½	Pa. Steel, pref....	103 - 104
Locomotive, pref..	104½ - 106	Warwick.....	10 - 10½
Nat. En. & St., com.	18½ - 19½	Crucible St., com..	11½ - 12½
Pressed St., com....	31½ - 36	Crucible St., pref..	82 - 84½
Pressed St., pref..	93½ - 96	Harb.-W. Ref., com.	33½
Railway Spr., com.	31½ - 38½	Harb.-W. Ref., pref.	94

\* Ex dividend.

**Dividends.**—The American Car & Foundry Company has declared the regular quarterly dividend of 1¼ per cent. on the preferred stock and ½ per cent. on the common stock, both payable July 1.

The Canadian Westinghouse Company, Ltd., has declared the regular quarterly dividend of 1½ per cent., payable July 11.

The Canadian Car & Foundry Company has declared the regular quarterly dividend of 1¼ per cent., payable July 20.

The Ingersoll-Rand Company has declared the regular semi-annual dividend of 3 per cent., payable July 2.

The American Brake Shoe & Foundry Company has declared the regular quarterly dividends of 1¼ per cent. on the preferred and common stocks, payable June 20.

### Labor Notes

The National Steel Castings Company, Montpelier, Ind., has advanced the wages of molders and coremakers 25 per cent. and of other employees, except salaried officers, 5 per cent. The company is running its plant at capacity.

The Philadelphia foundrymen operating union shops are endeavoring to effect an amicable settlement with their molders and coremakers. In April a general demand for an advance was made, but no conclusion was then arrived at. Late in May a more determined position was taken, and on June 1 quite a number of men went out. After conferences between the representatives of the foundrymen and officials of the Iron Molders' Union, the men have returned to work pending an adjustment, the agreement arrived at to become effective as of June 1. The molders ask for an advance from \$2.90 to \$3.25 per day; piecework molders an advance of about 10 per cent.; coremakers an increase from \$2.75, minimum, to \$3.25, minimum, per day.

No result was reached at the conference held in Detroit last week between the Wage Scale Committee of the Amalgamated Association and representatives of the Western Bar Iron Association. There is an agreement between them for continuous operation of the mills after July 1, in the event of the scale not being settled prior to that date. Therefore, the bar iron mills in the Western Association will not be obliged to close down, but some will probably do so for inventory and repairs. A conference between the Amalgamated Association and the Republic Iron & Steel Company and also with the sheet and tin plate mills that sign the Amalgamated scale is now being arranged, and will be held at an early date.

The Cambria Steel Company, Johnstown, Pa., has secured a contract from the Berwind-White Coal Mining Company for 800 steel cars, Pennsylvania type, of 50 tons capacity. The company reports making good progress on the erection of its new wire works. J. E. Loongren, formerly with the wire department of the Colorado Fuel & Iron Company, has charge of this department, and is now on the ground superintending the installation of the new equipment.

The Entertainment Committee of the Philadelphia Associated Foundry Foremen's Association has decided on a banquet early in the fall instead of a summer outing.

## The H. H. Franklin Mfg. Company's Technical Class

To provide thorough training in practical mechanics, including both textbook and manual work, the H. H. Franklin Mfg. Company, manufacturer of automobiles, Syracuse, N. Y., has established what it designates as a technical class, for which it provides a four-year course of instruction. The company maintains that continued training of young men in mechanical and industrial work is something which is bound to be permanently productive of good, both in the locality immediately affected and in the community at large; the Franklin technical class, therefore, provides for the admission of applicants not only from Syracuse and its surrounding towns, but from distant parts of the country as well. In a statement explanatory of its aim in the establishment of this technical class the Franklin company says:

This branch of our work is under the immediate charge of a competent instructor, who is a graduate of the mechanical course of Purdue University. Students entering this course have many advantages which were not possible under the old-fashioned apprentice system, where a boy was turned loose to the tender mercies of this or that particular foreman. Under our plan, in addition to the regular work, which is the regular work of manufacturing, the student is given instruction under competent supervision and management.

He will be started on the simpler forms of work, such as drilling, centering, &c., and will be advanced according to his ability and application. He will always be under the general direction of the instructor, and each student will secure the same kind and amount of instruction.

As far as possible, the instructor will look after students both in and out of the plant. He will endeavor to see that they have fair treatment and proper instruction, will assist in settling their shop grievances, will endeavor to see that the student does not idle away his time, but puts forth his best efforts in all his work.

It is the desire and aim of the company to provide such a course of practical instruction that will fit persons for positions of usefulness and responsibility in its service. It hopes that in the time to come all supervising positions may be filled by those who have graduated from its technical classes. It is also the belief of the company that the best results will be obtained by allowing the student freedom to leave and by allowing the company freedom to dismiss any student whenever it deems it proper so to do. It is expected, however, that the advantages of the course will be sufficient to hold the student during the entire four years.

In more ways than one this course is designed for the benefit of such young men as are mechanically inclined, but are without the means or opportunity of securing the special training which is to be had in a college or school of technology. The feature which makes the Franklin course particularly attractive to such young men is that during the entire four years they are employed at a definitely predetermined wage, graduated from 8 cents an hour at the start to 20 cents an hour at the end, with a bonus of \$100 at the time of the award of the school diploma for completion of the course. This pay is considerably above that commonly given to apprentices and is used as an incentive to secure good material.

In two periods of two hours each week the following class or text book work will be taken up: Arithmetic, 10 weeks; algebra, 40 weeks; plane geometry, 50 weeks; trigonometry, 25 weeks; elements of machine design, 25 weeks; shop mathematics, 50 weeks; mechanical drawing, first two years; analysis of machines, last two years; shop supervision, short course. Lectures will from time to time be given.

The factory work includes drilling, milling, lathe work, bench work, gear shaper and automatic screw machine work, grinding, tool work, erecting, small assembly and tool designing.

To be eligible for entrance to the technical class an applicant must be between the ages of 16 and 20 years, and must have had a grammar school education or its equivalent. He must be physically sound and of good character and appearance. The first 12 weeks will be

a probation period, that time being designated as a term of trial. If satisfactory at the end of that period the course dates back from the beginning of the period of trial. Each year of the course consists of 2700 working hours, making a total of 10,800. Inasmuch as no contract is made between the company and the pupils in the class, sole reliance is placed on the attractiveness of the course to hold the men to complete it.

## A New Vise and Wrench Factory

The Du Charme Wrench & Novelty Mfg. Company, Johnstown, Pa., of which William S. Du Charme is president, has completed another addition to its new plant. The company will shortly place on the market a new pipe vise which is unique, in that it has several parts that permit quick adjustment to what is to be held, after which a slight turn locks it. The vise will be simply constructed, of a few parts, making it light in weight, but serviceable, and considerable business is expected to be done with it in the pipe field. The company will also manufacture a line of adjustable alligator wrenches, an offset handle fixture wrench, a self-adjustable quick-acting wrench and a turret-head nut wrench. The last named is a combination of five standard sizes in one device. These tools have been especially designed for pipe, machine and automobile uses. About July 1 the company will have its salesmen calling on the trade. About that time it will also consider making contracts with jobbers to handle its line.

**Cambria Sales Managers in Convention.**—The various sales managers of the Cambria Steel Company are holding their convention in Johnstown, Pa., this week. Most of them arrived Tuesday, when an inspection of the plant took place. Wednesday morning the general session opened. At this meeting a number of the various executive and operating officials addressed the sales managers. Reports secured from a number of these managers indicate that current business is good, with every indication pointing to its continuation.

**A New Koppers Coke Oven Plant.**—The Woodward Iron Company, Birmingham, Ala., has given a contract for the building of 60 Koppers by-product coke ovens at its blast furnace plant at Woodward, Ala. It is expected that the number will ultimately be increased to 120 ovens, with a daily capacity of 555 tons of coke, 4,700,000 cu. ft. of gas, 4700 gal. of tar and 9.4 tons of sulphate of ammonia.

The Canadian Steel Corporation is to be organized with a capital of \$25,000,000, and headquarters at Hamilton, Canada. It will take over the Hamilton Steel & Iron Company, Hamilton; Canada Screw Company, Hamilton; Canada Nut & Bolt Company, Toronto, with plants also in Brantford and Gananoque, and Montreal Rolling Mills, Montreal. Representatives of the several companies are now at work on the details of the consolidation.

The Western Dry Dock & Shipbuilding Company now has under construction a plant at Port Arthur, Ontario, Canada, which will be capable of handling the largest boats at present on the lakes. The keels for two 600-ft. freighters are expected to be laid as soon as the plant is far enough advanced. The plant will comprise a complete boiler shop, rolling and punching shops, pattern shop and foundry. James Whalen of Port Arthur is president of the company, and there are large Cleveland interests in the organization.



## The Machinery Markets

Machinery trade reports from all parts of the country indicate that there is an undercurrent of good business, and there are inquiries in nearly all the machinery centers which if they materialize into business will keep the market on a sound basis for some months to come. In the East there is a fair sized list before the trade for railroad requirements and other good railroad business is in sight, while the general manufacturing field is taking good sized lots of machinery of every description. The Milwaukee market is especially strong, and a renewed buying movement has been inaugurated there, which includes a heavy demand for power and electrical machinery. Machine tool builders in that territory are planning enlargements and the local foundries and general repair shops are too busy with work offered in their own territory to go after much outside business. In Cincinnati the railroads have been placing some scattered business, and the demand for machine tools is reported better. In Chicago the Pennsylvania Railroad lines have been purchasing, and in Cleveland the automobile trade gives promise of some good future business. In the Central West, municipal buying is supporting the market, and there is a decidedly good demand for agricultural machinery. There has been some good buying of power plant equipment on the Pacific Coast, but those in other lines are experiencing a rather dull period. It is evident, however, that the railroads in that territory will have to do considerable purchasing soon. In the Northwest the market holds firm, and Oklahoma and Texas are offering good opportunities for foundry and shop tool sales. The market in the South continues on a fairly good basis. Encouraging machinery reports come from Pittsburgh, where numerous shop additions and improvements have been planned by manufacturers of metal working equipment. The chief trouble in that market is the scarcity of skilled labor.

### New York

NEW YORK, June 8, 1910.

While the actual business placed in this market during the last week was not as large as the business done during May, a fair aggregate of orders were booked by New York machinery houses. There were no especially large orders placed and the business that was done came from the general manufacturing field and covered about every class of machinery equipment. There is an undercurrent of good business being done in this territory and the inquiries before the trade indicate that the market will continue in a healthy condition for some weeks to come. Westinghouse, Church, Kerr & Co., 10 Bridge street, New York, have a list of machine tools out which calls for about \$10,000 worth of equipment to be delivered at Wichita, Kan., for the Kansas City, Mexico & Orient Railroad Company. This list calls for hydraulic presses, drill presses, lathes, planers, boring mills, &c., and some of the specifications are for extra heavy machines. It is said in the trade that this list is only preliminary, and later on the company will do further buying for the Wichita shops. A large steel working company in Maryland has inquiries out for a good round lot of equipment, which it is understood will be bought providing the company is successful in securing a contract from the Panama Canal Commission, on which it has made a bid. Recent utterances attributed to President Brown of the New York Central Railroad, which were to the effect that this company would cancel orders for steel cars and curtail expenditures because of the proposed adverse legislation against the railroads, do not seem to be bothering the machinery trade. The New York Central Railroad has inquiries out covering considerable equipment which was to be purchased by an appropriation recently made by the New York Central Lines. Machinery men who have consulted with the railroad engineers connected with the purchasing affairs of the company declare that these orders will be closed out shortly, as the railroad engineers have been given no instructions to the contrary, nor do they think that any instructions of the kind will come.

Manufacturers of Corliss engines and manufacturers of electrical power equipment have been doing a good business in this market within the last six weeks, and the New York office of one large Corliss engine manufacturer has booked more orders during May than in any month of the year 1906. The demand for this equipment comes largely from small manufacturers, and the engines sold range from 100 to 300 hp. capacity.

The export business in machinery and special machine tools continues especially good. Among the inquiries now in the market is a small list of tools to be purchased by the New York Engineering Company, 2 Rector street, for delivery in Siberia. This list covers several machine tools and appliances and calls for an expenditure amounting to about \$6000.

Westinghouse, Church, Kerr & Co., 10 Bridge street,

New York, are preparing plans for a number of large railroad repair shops for different railroad companies, and just now the engineering company is in the midst of buying machinery for large shops it is constructing for the Kansas City, Mexico & Orient Railroad Company at Wichita, Kan. These shops consist of a locomotive repair shop, 150 x 220 ft., a car shop, planing mill, a 10-stall roundhouse, storage house, cold storage plant and office building. It is understood that the company will spend a large amount of money for the necessary machinery equipment for these shops, which will be one of the largest repair plants on the railroad company's system. In addition to this project, Westinghouse, Church, Kerr & Co. have plans under way for three shops for the Chesapeake & Ohio Railroad, two shops for the Chicago & Alton, one shop for the Chicago, Burlington & Quincy, two shops for the Missouri Pacific and one shop for the Wheeling & Lake Erie Railroad.

The Covington Machine Company, Covington, Va., has, through its Eastern sales office, 50 Church street, New York, recently taken orders for six heavy punches and shears weighing about 110 tons, to be delivered to the Detroit Bridge & Steel Works, Detroit; a double punch and shear weighing about 80,000 lb., for the Chesapeake & Ohio Railroad; two machines for the Baldwin Locomotive Works, Philadelphia, Pa.; a heavy double punch and shear for the York Safe & Lock Company, York, Pa.; a special multiple punch and angle shear to the E. Van Noorden Company, in addition to 10 punches and shears for delivery in New York, Buffalo, Pittsburgh and for export.

J. A. Clark, manufacturer of gasoline engines, Herkimer, N. Y., has purchased a four-story brick building on King street, that city, which was formerly owned by the Herkimer Mfg. Company. The plant is being converted into a machine shop for general work, and special equipment is being installed for the manufacture of gasoline engines.

The Globe Malleable Iron & Steel Company, Syracuse, N. Y., has under construction a new drop forging plant which will be completed and in operation by July 20. The company will start operations in the shop with 10 drop hammers. All contracts for the necessary equipment have been let.

The J. W. Pohlman Foundry Company, Buffalo, N. Y., manufacturers of Niagara stoves and ranges, as well as gray iron castings for the general trade, has purchased the plant at Baitz avenue and the Erie Railroad formerly occupied by the Buffalo Steel & Shafting Company, and will enlarge and equip same for its business, which will be removed from the present plant at East Delavan avenue and the Erie Railroad. A brick building, 60 x 240 ft., on the newly acquired property will be used as a foundry and finishing shop, and an additional building, 32 x 120 ft., one and two stories, erected for warehouse and office purposes. Considerable grinding and polishing machinery and motor equipment will be installed in the new plant, which will be operated by Niagara Falls power. J. W. Pohlman is president and treasurer, and W. F. Pohlman, secretary.

The Augustine Rotary Engine Company, Buffalo, N. Y., will shortly add about 60,000 sq. ft. of manufacturing space to its plant at Elmwood avenue and the International Bridge branch of the Erie Railroad.

The Field Force Pump Company, Elmira, N. Y., has let

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contracts for a two-story factory 70 x 110 ft., which it will erect at Elmira Heights.

The New Process Rawhide Company, Syracuse, N. Y., has started construction on a one and two story addition to its plant on Plum street.

The Kimo Shoe Polish Company, Buffalo, N. Y., is placing contract for a two-story factory building 50 x 150 ft., brick, steel and cement construction, which it will erect at Main street and Fillmore avenue. W. R. Hollingshead is manager, 297 Huntington avenue.

The Automatic Arms Company has been incorporated at Buffalo, N. Y., with a capital stock of \$100,000, to manufacture and deal in firearms. Incorporators, G. R. Klahs, F. W. Ely and J. E. McAlpine, 1317 Chamber of Commerce Building. Arrangements regarding the manufacturing plant are not yet ready for announcement.

The Breeze Carburetor Company, 250-252 South street, Newark, N. J., is in the market for a center grinder and three automatic screw machines to be  $\frac{5}{8}$ -in.,  $\frac{3}{4}$ -in. and  $1\frac{1}{4}$ -in. sizes. The company prefers to obtain the machine second hand if possible.

A. D. Rogers, consulting engineer of Collingswood, N. J., is preparing plans and specifications for a water plant which the municipality contemplates erecting. The appropriation for the proposed water plant will be made as soon as some legal technicalities are disposed of. The plant will cost within \$125,000, and the system will include artesian wells, a filter plant with a capacity of 500,000 gal. daily, and provision made so that it can be extended to filter 1,500,000 gal. daily, a dual pumping system throughout, consisting of safety water tube boiler, cross compound crank and flywheel, condensing engines and air compressors and condensers for raising the well water to the filter. A new distribution system will be installed and it will be complete with a stop valve system throughout. The plans call for about 100 new fire hydrants.

The municipality of Fulton, N. Y., will on June 17 award a franchise to sell Niagara power to the city.

The Sall Mountain Asbestos Mfg. Company, Chicago, Ill., manufacturer of Reliance roofing, has established an office at 45 Broadway, New York, for handling its export business.

### Business Changes

The Royal Metal Steel Company, sole American importer for the Chatillon, Commentry & Neuves-Maisons Steel Corporation, Paris, France, is moving its offices from 17 Bridge street to 1926 Broadway, New York. The Chatillon, Commentry & Neuves-Maisons Steel Corporation is one of the largest manufacturers of steel in the world, employing over 12,000 men, and its agent reports a rapidly increasing business in this country.

### Chicago

CHICAGO, ILL., June 7, 1910.

Even the machine tool trade has been affected by the weather the past couple of weeks. The month of May was unusually cold and backward and June found us still wearing overcoats and calling for steam heat. Unseasonable weather always has a depressing effect on people and furnishes a good excuse to delay any purchases or new business that can be postponed, and in the Western market this feeling has been reinforced by the more important fact that the corn crop is getting a very late start. Western business men watch the corn crop with a great deal more interest than the stock market. There has been a great deal of talk to the effect that corn is getting a poor start and it will take unusually favorable weather later on to make a good crop.

In the face of all the discouraging conditions that might be mentioned, there is a fair amount of business in the machinery market. This is especially true of smaller tools and machines of more general use. The agricultural implement manufacturers have been liberal buyers of the class of equipment which they use—punches, bulldozers, drill presses, &c.—and there is a good scattering demand from other manufacturing industries and from local machine shops. The dealers make a better profit on this business than on large orders and some of the houses which depend entirely on general trade seem to find conditions quite satisfactory. There is some complaint that the demand is light for high class equipment, outside of the automobile industry. The differences between the railroads and shippers over freight rates have dampened the hopes of any extensive buying in the near future by the railroads, and in heavy tools it is expected that the market will be quiet during the summer. The Pennsylvania Lines, however, appear to be an exception among the railroads. Dealers who have persisted in their efforts to obtain a copy of the Pennsylvania list of tools have been advised recently that practically all the tools inquired for on the list have been bought. The Kansas City Southern

Railroad has recently inquired for a small list of eight tools. Other railroads are making occasional purchases of tools that are urgently needed.

The La Salle Machine & Tool Company, La Salle, Ill., has for some time had under consideration the enlargement of its plant. At a recent meeting of the Board of Directors it was determined to put this plan into effect. A building equally as large as the present structure, 48 x 95 ft., will be erected as an extension of the present machine shop, which was built a little over two years ago. The addition is to be completed by August 1. The company needs the additional room so that it may manufacture advantageously certain large machines which it expects to make. The addition will be equipped with the most improved tools. The equipment required has been purchased.

A shop addition for the manufacture of enameled ware is being made to the plant of the Coonley Mfg. Company, Clyde, Ill. The dimensions are 105 x 115 ft.

An addition is about to be built to the boiler house of the Aurora, Elgin & Chicago Railroad at its Batavia, Ill., station, and new equipment installed.

The Galena Iron Works, Galena, Ill., will furnish power and pumping machinery for operations in a new shaft at what is known as the Wilkinson mine, near Benton, Wis.

Two large gyratory crushers and other machinery have been installed by the Biggsville Crushed Stone Company, recently organized to develop quarries near Biggsville, Ill. Some additional equipment will be needed later, but for the present the company's requirements have been supplied.

A new plant of considerable size will be erected by the Springfield Gas Light Company, Springfield, Ill.

The machine shops of the Consolidated Indiana Coal Company will be moved from Shelburn to Hymers, Ind., where new shops will be erected.

The Hunt Mfg. Company has been organized and incorporated at Garrett, Ind., to manufacture store fixtures and furniture. The directors are Leigh Hunt, W. J. Frederick, Charles Abel and E. F. Clark. The capital stock is \$10,000.

J. W. P. Meltzer & Co. will erect a plant at Ray's Crossing, Ind., to manufacture lightning rods.

The Ansted Spring & Axle Company, Connersville, Ind., has let the contract for a steel structure to take the place of the temporary building erected after the recent fire. The Pan-American Bridge Company, Newcastle, Ind., secured the contract. The main building will be 295 ft. long.

The La Fontaine Handle Company is erecting a plant at Decatur, Ind. The company will manufacture all kinds of farm tool and shovel handles.

The Western Rubber Company, Goshen, Ind., has let the contract for two new buildings of brick and steel, one 45 x 125 ft., the other 45 x 85 ft. The cost, with equipment, will be about \$50,000.

The Bromwell Brush & Wire Goods Company will build an addition to its plant at Greensburg, Ind., to cost \$20,000. It will be a brick building, 60 x 250 ft. Forty additional wire machines will be installed and the sherardizing plant will be doubled.

The Angola Engine & Foundry Company, Angola, Ind., has increased its capital stock to \$150,000.

The National Lock Company has been organized at Indianapolis, Ind., with \$10,000 capital stock, to manufacture coin and other locks. The directors are H. C. Anderson, J. M. Johnston and R. S. Norwood.

### Philadelphia

PHILADELPHIA, PA., June 7, 1910.

Reports received from both manufacturers and merchants show considerable irregularity as to the volume of business transacted during May. In several instances the placing of a few fair orders brought the amount to a satisfactory total, but as a rule business during the month showed no marked betterment. The closing week was by far the best of the month, and a fair number of orders were booked, which had been pending for some time. The sales were largely of a general nature, although there was a rather pronounced call for heavy boring mills, several of which were taken by railroads and one of the large steel plants. A rather heavier movement in tools of the smaller size is to be noted, largely single tool purchases. June opened up a trifle more favorable, and, while there is very little of a sizable nature now before the trade, several good propositions in the way of general equipment are in sight and may develop in the next month. There is still some hesitancy on the part of the railroads in connection with programmes under consideration.

Manufacturers are very well fixed with orders on their



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books, having enough work ahead to keep them pretty well engaged for some time. Competition for business offered is, however, very sharp, and in one or two instances it is rumored that prices have been shaded in order to book desirable orders.

A comparatively good volume of business is being done in second-hand tools, general machinery and power equipment. New power equipment is also in fairly good demand.

It is stated that the plant of the Reading Steam Heat Company will undergo considerable improvement after the customary closing down of the plant, which is usually done on June 1. Details as to proposed improvements are not available.

A fire slightly damaged the foundry of the Buchanan Foundry Company, Lebanon, Pa., May 28; it will in no way inconvenience the operation of the plant.

Henry A. Romberger, Bourse Building, has awarded a contract for a two-story brick addition, 50 x 160 ft., to be made to a hosiery mill at Newport, Pa.

Local contractors are estimating on an addition, 90 x 101 ft., four stories, to be made to the plant of the John Uhmer Packing Company, Pottsville, Pa.

S. S. Eveland, who was formerly connected with the Standard Roller Bearing Company, has had plans prepared and estimates are being taken by H. E. Grau & Co. for a machine shop, 225 x 312 ft., an office building, 60 x 100 ft., and a power plant 50 x 70 ft., which it is proposed to erect at Fifty-sixth street and Lancaster avenue. A considerable quantity of machinery will ultimately be required for the equipment of the plant, but plans in this respect have not been fully developed.

The J. W. Paxson Company has recently made additions, 44 x 100 ft., to its machine shop, 1051-1076 Beach street, and installed a 50 hp. De La Vergne oil engine. Additional machinery for its blacksmith and plate shop has been installed, and the purchase of further equipment is under consideration. This company reports several good orders for Paxson collian cupolas, one of 86 in. diameter for S. L. Moore & Sons, Inc., Elizabethport, N. J., one 84 in. diameter for the Oscar Barnett Foundry, Newark, N. J., and one of 76 in. diameter for the J. L. Mott Company, Trenton, N. J. A good demand for sand blast machinery and overhead tram rail systems is also reported.

The Philadelphia Roll & Machine Company has the addition to its machine shop well toward completion, and is working its plant at practically full capacity. Orders for a number of heavy sand cast rolls, 25, 28 and 26 in. in diameter, heavy chilled rolls, machinery castings and gears of charcoal air furnace iron were also recently received. This company will have a complete sheet mill ready for shipment to a Canadian customer during the month.

A charter has been granted under the Pennsylvania laws to the Southern Pennsylvania Traction Company, with a nominal capital of \$10,000, to operate trolley or cable lines and to furnish power in Delaware County, Pa. The incorporators are G. R. Webb, Baltimore, Md., O. T. Crosby, Warrenton, Md., D. L. Evans, Pottstown, Pa., Jacob H. Rhoades and William H. Snyder, Philadelphia. The incorporators are not yet prepared to make any statement as to their proposed plans.

The Espen-Lucas Machine Works is now pretty well established in its new plant at Girard avenue and Front street. Considerable new machinery has been installed in order to get the new plant started, and further purchases will be made from time to time. A very fair demand for cold saw cutting-off machines of various types is reported, as well as that for boring machines and other special tools, while sufficient orders are now on hand to keep the plant well engaged for some time ahead.

Samuel G. Dixon, Commissioner of Health, State of Pennsylvania, 1900 Race street, Philadelphia, will take bids until June 22, for the furnishing of all materials and labor necessary for the erection and completion of a central heating plant at the Pennsylvania State South Mountain Sanatorium, near Palo Alto, Pa., in accordance with revised plans and specifications, which may be obtained at the office of the Commissioner of Health, Harrisburg, Pa., or at his local office.

Alfred Box & Co., manufacturers of electric and hand power cranes, are operating all the departments of its plant at full capacity. This concern has recently booked quite a number of orders, among which are included three 5-ton and one 10-ton, 75-ft. span, 3-motor electric traveling cranes for the Midvale Steel Company; a 5-ton 3-motor, 73-ft. span crane for the Pittsfield, Mass., plant of the General Electric Company; a 2-ton hand power crane for the C. H. Wheeler Pump Company, Philadelphia; a 17½-ton hand power crane for the Edison Electric & Illuminating Company, Brooklyn, N. Y.; three 1000-lb. hand power cranes, runways, &c., for the Bell Brook Bleachery Company, Fairview, N. J.; a 10-ton 4-motor electric traveling crane for Ladd & Baker, engineers, Philadelphia, and a 5-ton, 3-motor crane for the

Kenneth Foundry Company. Recent shipments include a 15-ton 3-motor crane, 57 ft. span, for the American Iron & Steel Company, Lebanon, Pa., two 1-ton hand power jib cranes for export to Cuba, and a 3-ton 2-motor crane is about ready for delivery to the Morris Engineering Company, Philadelphia. A very satisfactory business in Box electric hoists is also reported.

Considerable new machinery was recently installed by the Birdsboro Stone Company in connection with its quarries near Birdsboro, Pa., and some additional equipment will be needed at intervals during the year.

Interest is again being aroused regarding the building of the proposed tunnel under the Delaware River by the Philadelphia & New Jersey Tunnel Company, connecting Philadelphia and Camden. Stern & Silverman, engineers of this project, which was under consideration something over a year ago, propose now making test borings in connection with this work. What the outcome will be is still uncertain, as legislation, particularly in Camden, N. J., has not been favorable to the project.

The Philadelphia Electric Company is taking estimates for the erection of a sub-station, to be known as Station F, located on Twentieth street, extending from Ranstead street to Ludlow street. The only equipment to be installed will be switchboards and motors. Electric power from its main station will be used.

### Cincinnati

CINCINNATI, OHIO, June 7, 1910.

Machine tool manufacturers, while intensely interested in the contention that has arisen during the week between the railroads and the Government, have not as yet seen any of the possible evil effects predicted by some manufacturing interests. During the week some orders for single machines and tools have been received from railroad interests. Lathe makers and manufacturers of upright drills were also in receipt of specifications for seven or eight tools for the Kansas City, Southern Railroad. Taken as a whole, the trade is rather well satisfied with the way June has opened up, but it must be stated that this sentiment is obtained almost wholly from the larger producers. The smaller concerns, working with limited forces and depending on current business are complaining. Because of this, fact, therefore, general business in planers, radial drills and shapers, which last week and for some days had been reported slow, has shown improvement; and this is particularly true of radials and shapers. In engineering specialties, valves and fittings, business is reported satisfactory in volume, with forces well engaged at the factories, but business as a whole is coming mostly for absolute necessities and well distributed.

The Lunkenheimer Company in this class makes an optimistic report and is evidently preparing for a large fall business as the finishing work on the big concrete foundry structure which had been delayed some time is now being rushed to completion. This five-story building, with floor space of 200,000 sq. ft., is expected to be ready for occupancy some time in July. The old quarters of the brass foundry across the road will be immediately fitted up as an iron foundry, and all this character of work which has heretofore been contracted outside will be handled by the company. On the top floor of the new foundry building a large number of electric furnaces have been installed, and a series of sand conveyors placed. Necessary equipment is for the most part bought, but some machinery and appliances are yet to be provided.

Bids are still being received by the architects, Samuel Hannaford & Sons, for the new plant of the D. T. Williams Valve Company on Hunt street, Cincinnati. This company reports business satisfactory, the major portion of it at this time being completion of contracts with automobile concerns.

The American Tool Works Company reports a full force engaged in all departments on full time and business enough in sight to thus continue operations through July and August. This company's business in May was the best for that month in its history, and orders on shapers, planers and radials contributed largely to this estimate.

The incorporation of the Stewart Iron Works Company, Covington, Ky., is an important item of the week. The Stewart Iron Works Company, making a specialty of iron fence and lawn furniture, and the Stewart Jail Works Company, whose specialty is jails, prisons and steel vaults, were merged under the incorporation name mentioned with \$400,000 preferred and \$600,000 common stock. The enterprises were started 25 years ago at Wichita, Kan., by R. C. and W. A. Stewart and have prospered continuously. The business was moved to Cincinnati in 1893, and in 1903 the present large plant was built in Covington, at Seventeenth and Madison avenues.

## THE MACHINERY MARKETS

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The auction sale of the machinery in the shops of the James H. Whittle Company, Worcester, Mass., manufacturer of textile machinery and tinware, June 2, brought good prices, considering the condition of the equipment. It proved an example of hard usage of even the modern tools had resulting in exceedingly rapid depreciation.

The Lombard Steam Log Hauler Company, Waterville, Me., has awarded the contract for an addition to its shops, 38 x 110 ft., two stories. The building will be devoted to the manufacture of a 65-hp. four-cylinder four-cycle gasoline engine, which will be assembled in a new traction device, the invention of A. O. Lombard, for farm uses and for drawing all kinds of lumber, &c., over turnpike roads. A specialty will be hauling gang plows in the Middle West. The building will be ready for occupancy in August.

The Massasoit Company, Chester, Mass., manufacturer of grinding wheels and specialties, is erecting an additional building, 40 x 150 ft., three stories, which will be used exclusively as a machine department for mixing and shaping the product, relieving the present large structure for baking. The company is planning to increase its output in a large way. Larger machines and new ovens and kilns will be installed together with all other equipment required in a modern emery wheel plant for manufacturing on an extensive scale.

The business of the Risdon Machine Works, Waterbury, Conn., has been incorporated as the Risdon Tool & Machine Company. W. L. Shepard is the president, A. H. Dayton vice-president and George T. Wigmore secretary and treasurer. The directors are Matthew Adgate, C. T. McCarthy, W. J. Neary, G. W. Andrew and G. T. Wigmore, Naugatuck, Conn., and C. E. Beardsley and W. L. Shepard, Waterbury. The facilities have been increased to do light manufacturing as well as for the products of the original corporation. The company designs and makes dies, models, tools, gravity levels and novelties in sheet metal.

The reorganization of the Oakley Steel Foundry Company, Millbury, Mass., manufacturer of crucible steel castings, is in process. William E. Oakley, the manager of the business, has retired, and his place as director has been filled by the election of William L. Neilson, assistant sales manager of the Norton Company, Worcester, Mass. The other directors are Fred W. Moore, Worcester; Henry T. Maxwell, Millbury; H. H. Merriam and W. A. Pentacost, Worcester. Full details of the future of the organization are not yet perfected, but radical changes in manufacturing methods have been inaugurated at the works at Millbury, and the resultant improved product has brought a large increase in business.

The Ready Tool Company, Bridgeport, Conn., manufacturer of lathe tool holders, is making plans to increase rapidly the manufacture of its product.

The Narragansett Electric Lighting Company, Providence, R. I., will establish a station at Olneyville, R. I., and has awarded the contract for a three-story building, 20 x 40 ft., to cost \$25,000.

The Union Twist Drill Company, Athol, Mass., manufacturer of twist drills, gear and milling cutters, is making plans for a large addition to its works, final details of which have not been decided upon.

The Turner & Seymour Mfg. Company, Torrington, Conn., has increased its capital stock from \$100,000 to \$250,000.

The business of Ashworth Bros., Fall River, Mass.,

textile machinery, has been incorporated as the Ashworth Bros., Inc., with capital stock of \$400,000.

The Saco & Pettee Company, Newton, Mass., and Biddeford, Me., manufacturer of textile machinery, has been incorporated under Massachusetts laws, with a capital stock of \$1,600,000.

The last obstacle seems removed from the project of the Northern Connecticut Power Company to establish a great hydraulic station in Enfield, Conn., damming the Connecticut River for the purpose, an undertaking which will not only provide very large amounts of power, but which will render the river navigable to Springfield and Holyoke, Mass. The Connecticut River Company, which supplies power from the river to the Windsor Locks manufacturers, had stood in the way of the enterprise, but it is now announced officially that an arrangement has been made between the two corporations by which the Northern Connecticut Company will furnish the old company with an adequate supply of water for its needs, and that objections, which have been largely in evidence at Washington, in connection with the required Congressional permission to build the dam, no longer exist. The dam will give a 30-ft. head of water, and the volume is so very large that the estimated development is 35,000 hp. A lock will permit of the passage of boats of considerable tonnage, placing the two Massachusetts cities in touch with tidewater, giving them the advantages of water freights as well as their share in the power. Between \$4,000,000 and \$5,000,000 will be expended on the project. The New England rivers possess large potentialities in the way of future hydroelectric developments, which will serve a very great purpose in offsetting the distance of the States from the coal fields. Of especially vital importance is the relation of these undertakings to the inland cities, which have to pay heavy tolls to get their coal from tidewater.

Another great power project is planned for the Deerfield River by interests reported to be closely allied with those which are operating the power property at Vernon, Vt., on the Connecticut River, and transmitting it in large units to various manufacturing centers, notable among them Worcester, Mass. The Deerfield is a tributary of the Connecticut. The topography of the country is such that a storage reservoir can be created just over the New Hampshire line from Massachusetts, and the water carried by a flume with a fall of 800 ft. to a power station at Zoar, Mass., south of the Hoosac Tunnel. The combination of this enormous head—which puts the development in a class by itself in the East—with ample water storage, assures, it is estimated, 25,000 hp. The published report has it that a considerable portion of the water rights are already in the possession of the promoters, who are known to be strongly backed financially.

### Pittsburgh

PITTSBURGH, PA., June 7, 1910.

Inquiries for machine tools appear, during the past few days, to have been somewhat more liberal, and dealers are figuring on a number of rather good lists. Among metal working plants generally there are now in progress extensive preparations for future expansion. In this district alone requirements for new plants or shop additions will be heavy and numerous improvements in operating machinery are planned. Scarcity of skilled labor, to which allusion has heretofore been made, continues. Manufacturers of the district are advertising in Pittsburgh papers for pattern makers, molders for machine and floor work, forge hands, die makers, setters, jig makers, fitters, lathe operators, milling machine, boring machine and drill hands, bulldozer form fitters, foremen, electrician, &c. Tool men are particularly wanted.

Among the cities in this section which offer free manufacturing sites, in the competition for new industries, are Grafton, W. Va., Mingo Junction, Ohio, and East Palestine, Ohio. Cheap fuel and other advantages are held forth as inducements. Each place has a board of trade and solicits inquiries addressed to the secretary.

The plant formerly occupied in Pittsburgh by the Pennsylvania Car Wheel Company will be offered for sale by W. A. Chamberlain of this city, whose office is in the Farmers' Bank Building.

The Shreve Chair Company, Union City, Pa., is in the market for a Corliss engine of about 450 hp., slow speed, to operate at 100 lb. boiler pressure.

The Union Utilities Company, Morgantown, W. Va., which has an electric generating station of 750 kw., will install a low pressure turbine to operate on the exhaust from the Westinghouse engines already in service, thus driving another generator, which will almost double the capacity of the plant. The necessary machinery, including all auxiliaries, has just been contracted for.

As a part of its improvements at the docks in Lorain, Ohio, the Baltimore & Ohio Railroad Company will install a synchronous motor generator set of 300 kw.

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The manufacturers are finding no change from a prosperous volume of business. Exceptions exist, to be sure, but the machine tool industry as a whole has little to complain of, excepting a scarcity of labor. The market for engine lathes is less active than some other lines. Possibly the turret machines are partly responsible for this. They are in great demand. An excellent illustration of this is the experience of the Pratt & Whitney Company. A year ago the company had 550 turret machines in stock. Now deliveries are six and eight months away. The great shops at Hartford are employing between 1500 and 1600 men, several hundred more than ever before, and are anxious to add to the force, a scarcity of good men being the only reason for not increasing production still further. The estimate is that a smaller per cent. of the production is going to the automobile people. The market is more general than for a long time past.

The steel market here shows weak spots. Bar steel is being bought to meet immediate wants only. The tool steel people report variously as to their experiences with the market. One great house, selling foreign steels, found May to equal any month since 1906, but some other dealers have been less fortunate.

The auction sale of the machinery in the shops of the James H. Whittle Company, Worcester, Mass., manufacturer of textile machinery and tinware, June 2, brought good prices, considering the condition of the equipment. It proved an example of hard usage of even the modern tools had resulting in exceedingly rapid depreciation.

The Lombard Steam Log Hauler Company, Waterville, Me., has awarded the contract for an addition to its shops, 38 x 110 ft., two stories. The building will be devoted to the manufacture of a 65-hp. four-cylinder four-cycle gasoline engine, which will be assembled in a new traction device, the invention of A. O. Lombard, for farm uses and for drawing all kinds of lumber, &c., over turnpike roads. A specialty will be hauling gang plows in the Middle West. The building will be ready for occupancy in August.

The Massasoit Company, Chester, Mass., manufacturer of grinding wheels and specialties, is erecting an additional building, 40 x 150 ft., three stories, which will be used exclusively as a machine department for mixing and shaping the product, relieving the present large structure for baking. The company is planning to increase its output in a large way. Larger machines and new ovens and kilns will be installed together with all other equipment required in a modern emery wheel plant for manufacturing on an extensive scale.

The business of the Risdon Machine Works, Waterbury, Conn., has been incorporated as the Risdon Tool & Machine Company. W. L. Shepard is the president, A. H. Dayton vice-president and George T. Wigmore secretary and treasurer. The directors are Matthew Adgate, C. T. McCarthy, W. J. Neary, G. W. Andrew and G. T. Wigmore, Naugatuck, Conn., and C. E. Beardsley and W. L. Shepard, Waterbury. The facilities have been increased to do light manufacturing as well as for the products of the original corporation. The company designs and makes dies, models, tools, gravity levels and novelties in sheet metal.

The reorganization of the Oakley Steel Foundry Company, Millbury, Mass., manufacturer of crucible steel castings, is in process. William E. Oakley, the manager of the business, has retired, and his place as director has been filled by the election of William L. Neilson, assistant sales manager of the Norton Company, Worcester, Mass. The other directors are Fred W. Moore, Worcester; Henry T. Maxwell, Millbury; H. H. Merriam and W. A. Pentacost, Worcester. Full details of the future of the organization are not yet perfected, but radical changes in manufacturing methods have been inaugurated at the works at Millbury, and the resultant improved product has brought a large increase in business.

The Ready Tool Company, Bridgeport, Conn., manufacturer of lathe tool holders, is making plans to increase rapidly the manufacture of its product.

The Narragansett Electric Lighting Company, Providence, R. I., will establish a station at Olneyville, R. I., and has awarded the contract for a three-story building, 20 x 40 ft., to cost \$25,000.

The Union Twist Drill Company, Athol, Mass., manufacturer of twist drills, gear and milling cutters, is making plans for a large addition to its works, final details of which have not been decided upon.

The Turner & Seymour Mfg. Company, Torrington, Conn., has increased its capital stock from \$100,000 to \$250,000.

The business of Ashworth Bros., Fall River, Mass.,

textile machinery, has been incorporated as the Ashworth Bros., Inc., with capital stock of \$400,000.

The Saco & Pettee Company, Newton, Mass., and Biddeford, Me., manufacturer of textile machinery, has been incorporated under Massachusetts laws, with a capital stock of \$1,600,000.

The last obstacle seems removed from the project of the Northern Connecticut Power Company to establish a great hydraulic station in Enfield, Conn., damming the Connecticut River for the purpose, an undertaking which will not only provide very large amounts of power, but which will render the river navigable to Springfield and Holyoke, Mass. The Connecticut River Company, which supplies power from the river to the Windsor Locks manufacturers, had stood in the way of the enterprise, but it is now announced officially that an arrangement has been made between the two corporations by which the Northern Connecticut Company will furnish the old company with an adequate supply of water for its needs, and that objections, which have been largely in evidence at Washington, in connection with the required Congressional permission to build the dam, no longer exist. The dam will give a 30-ft. head of water, and the volume is so very large that the estimated development is 35,000 hp. A lock will permit of the passage of boats of considerable tonnage, placing the two Massachusetts cities in touch with tidewater, giving them the advantages of water freights as well as their share in the power. Between \$4,000,000 and \$5,000,000 will be expended on the project. The New England rivers possess large potentialities in the way of future hydroelectric developments, which will serve a very great purpose in offsetting the distance of the States from the coal fields. Of especially vital importance is the relation of these undertakings to the inland cities, which have to pay heavy tolls to get their coal from tidewater.

Another great power project is planned for the Deerfield River by interests reported to be closely allied with those which are operating the power property at Vernon, Vt., on the Connecticut River, and transmitting it in large units to various manufacturing centers, notable among them Worcester, Mass. The Deerfield is a tributary of the Connecticut. The topography of the country is such that a storage reservoir can be created just over the New Hampshire line from Massachusetts, and the water carried by a flume with a fall of 800 ft. to a power station at Zoar, Mass., south of the Hoosac Tunnel. The combination of this enormous head—which puts the development in a class by itself in the East—with ample water storage, assures, it is estimated, 25,000 hp. The published report has it that a considerable portion of the water rights are already in the possession of the promoters, who are known to be strongly backed financially.

### Pittsburgh

PITTSBURGH, Pa., June 7, 1910.

Inquiries for machine tools appear, during the past few days, to have been somewhat more liberal, and dealers are figuring on a number of rather good lists. Among metal working plants generally there are now in progress extensive preparations for future expansion. In this district alone requirements for new plants or shop additions will be heavy and numerous improvements in operating machinery are planned. Scarcity of skilled labor, to which allusion has heretofore been made, continues. Manufacturers of the district are advertising in Pittsburgh papers for pattern makers, molders for machine and floor work, forge hands, die makers, setters, jig makers, fitters, lathe operators, milling machine, boring machine and drill hands, bulldozer form fitters, foremen, electrician, &c. Tool men are particularly wanted.

Among the cities in this section which offer free manufacturing sites, in the competition for new industries, are Grafton, W. Va., Mingo Junction, Ohio, and East Palestine, Ohio. Cheap fuel and other advantages are held forth as inducements. Each place has a board of trade and solicits inquiries addressed to the secretary.

The plant formerly occupied in Pittsburgh by the Pennsylvania Car Wheel Company will be offered for sale by W. A. Chamberlain of this city, whose office is in the Farmers' Bank Building.

The Shreve Chair Company, Union City, Pa., is in the market for a Corliss engine of about 450 hp., slow speed, to operate at 100 lb. boiler pressure.

The Union Utilities Company, Morgantown, W. Va., which has an electric generating station of 750 kw., will install a low pressure turbine to operate on the exhaust from the Westinghouse engines already in service, thus driving another generator, which will almost double the capacity of the plant. The necessary machinery, including all auxiliaries, has just been contracted for.

As a part of its improvements at the docks in Lorain, Ohio, the Baltimore & Ohio Railroad Company will install a synchronous motor generator set of 300 kw.

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The Whitacre Fire-Proofing Company, Waynesboro, Ohio, will install an electric generating set of 100 kw., to furnish direct current for operating machinery in the factory.

The brass foundry of the Homestead Valve Mfg. Company, Pittsburgh, has been taxed to its full capacity in the production of parts for straight-way, three-way and four-way valves for power plant service, with other specialties of the company's manufacture.

The Merwin Mfg. Company, Erie, Pa., which recently increased its facilities for galvanizing, is putting on the market an improved wall tie, the principal features of which is a herringbone pattern.

Water works machinery is to be provided this summer at Hancock, Md.

The Williams Tool Company, Erie, Pa., through its subsidiary corporation, the Riblet Heater Company, is introducing among large gas engine users what is known as the Transverse Current water heater, designed to utilize the waste heat from an internal combustion engine, thereby effecting a material economy in shops or other buildings.

The Grafton Gas & Electric Light Company, Grafton, W. Va., which is operating two engine driven power units of 200 kw., furnishing alternating current, has had plans prepared for a plant of larger capacity.

The Des Moines Bridge & Iron Company, which has a plant in Pittsburgh as well as at Des Moines, Iowa, is competing for both Eastern and Western business. Sales offices here are in the Curry Building.

Some time this summer a list will be issued for tools needed in repair shops to be built by the Clarion & East Brady Electric Railway Company, Clarion, Pa., construction of whose interurban traction line is about to start. Plans will also be completed in the near future for a steam turbine power plant to be located at or near Rimersburg, Pa.

Manufacturers here expect to figure shortly on the machinery and other equipment for a municipal electric station of considerable size at Beaver, Pa. Gas engines may be used as prime movers for the generators.

The Pittsburgh representatives of the Platt Iron Works, as well as the main sales office in Dayton, Ohio, are having marked success this season in the sale of feed water heaters and purifiers among the iron and steel mills and other large industrial plants, especially where the water fed to the boilers is taken from a muddy stream, as frequently must be done in this district.

Contracts for new bridges to be constructed in Lawrence County, Pa., have been placed with the Penn Bridge Company, Beaver Falls, Pa. The same company has also secured considerable work in the West and South, including four steel structures to be erected in the vicinity of Colorado, Texas.

It has been reported from Tyrone, Pa., that the Tyrone Gas & Power Company will make improvements in its system. Whether this involves the purchase of any new machinery is not stated.

The Epping-Carpenter Company, Pittsburgh, has been experiencing a very active demand for condensing apparatus, including pumps, to be used in power plants in every part of the country, as particular attention is being given at present to the matter of operating economy, and the tendency in that direction seems to be increasing from one month to another.

Construction of the steel concrete buildings of the Tide-water Portland Cement Company's plant is now well under way at Union Bridge, Md., and machinery will be provided in time to have the works put in operation by the end of the year.

The Struthers-Wells Company, Warren, Pa., makes the interesting statement that its gas engines will develop 1 b.h.p. on 10,000 B.t.u., which means 12 cu. ft. of natural gas, or 1 1/4 lb. of fuel gasified in a suction type producer of the company's manufacture.

Edgar M. Moore & Co., 914 Farmers' Bank Building, Pittsburgh, will hereafter represent the following concerns in Pittsburgh, succeeding S. S. Stewart, 1225 Park Building, Pittsburgh, who, on July 1, goes to a Western State to engage in business there: Pittsburgh Feed Water Heater Company, Pittsburgh, manufacturer of boiler feed water heaters; Hershey Foundry & Machine Company, Manheim, Pa., manufacturer of Baum separators; Berry Engineering Company, Chester, Pa., and Foster Engineering Company, Newark, N. J. W. J. Snyder, formerly with the Consolidated Mfg. & Supply Company, Pittsburgh, is now sales representative for Edgar M. Moore & Co., and will look after the Foster line of valves, separators, &c., in Pittsburgh and vicinity. Edgar M. Moore & Co. represent in Pittsburgh a number of manufacturers of valves and fittings, iron and steel products, rails, pipe, cranes, feed water heaters, separators, &c., and maintain a stock department in the Pittsburgh Terminal Warehouses, S. S., Pittsburgh. They are distributing among customers a pocket wallet for hold-

ing letters, memorandums, &c., with a folder containing list of valves and machinery for prompt shipment inclosed.

### Detroit

DETROIT, MICH., June 7, 1910.

Orders for machine tools are fairly steady and inquiries for standard apparatus keep dealers busy making quotations, which go to all parts of the Central West. Second-hand machines could be sold in considerably greater number if stocks were larger, but, as is usually the case, the tools most wanted are those difficult to find, and the majority of buyers does not care for equipment which has previously been long in service. Machines that are nearly new sell the most readily. They bring almost as much as tools right from the makers.

Some antiquated stock, which has stood for a long time in the rear of dealers' warehouses, or held by former users for whom it has been listed, is being moved out at very low prices. The purchasers appear to be mainly proprietors of small repair shops that have been started up at country points, and a few such machines have gone to mining companies in the North. Taken altogether, there has seldom been a time when the market here was so completely cleaned up of offerings.

One of the most important events of the year, so far as the future of this market is concerned, was a trip recently taken by manufacturers, jobbers and dealers of Detroit and vicinity to cities of the upper peninsula of Michigan. Among the direct results will be the establishing of relations which are certain to bring to this city much of the trade that has been going elsewhere, especially in the line of machinery. Not only are the iron and copper mining companies buying freely this season, but numerous local industries, including a fair percentage of metal working plants, have been established in the upper tier of counties, and their needs in the line of equipment have been steadily increasing. Consequently, the territory is one which, as Detroit houses now seem to realize, is worth devoting more attention to than has heretofore been very generally given it.

Work is now in progress on the building, 60 x 300 ft., to be erected for the Swift Automobile Company in Wyandotte, Mich. Most of the equipment needed was recently contracted for, but more will be purchased between now and fall.

The George F. Herrig Company, Saginaw, Mich., has been appointed district sales agent of the Garwood Electric Company, Garwood, N. J.

Improvements in the equipment of the water works at Angola, Ind., are being planned.

The Diamond Power Specialty Company, Detroit, is marketing a blower for cleaning boiler tubes and flues, which is arranged to work automatically, and can be built directly into the setting.

A mechanical filtration plant may be installed this summer at Port Clinton, Ohio.

The Merrill Mfg. Company, Toledo, Ohio, is finding a large sale this season in field work of different kinds, including mining operations, for a pipe threading and cutting machine of its manufacture which is especially adapted to that purpose. In places where regular shop facilities are not available, this machine can be very handily used.

Contracts have just been let for the new forge shop, 80 x 360 ft., and two-story factory building, 80 x 140 ft., which will be erected this summer for the Packard Motor Car Company, Detroit.

Considerable mechanical equipment, including boilers, will be purchased this summer for the new Masonic Home at Grand Rapids, Mich. Specifications are being prepared by Osgood & Osgood of that city.

F. S. Seagrave, Detroit, has been in receipt of a heavy run of orders from all sections of the country for the Crescent cut-off valves of his manufacture, which are particularly adapted to use with large water hydrants.

Contracts have been let and work is being started on the new plant of the Gramm, Logan Motor Car Company at Lima, Ohio. The factory now in operation at Bowling Green, Ohio, is working to its fullest possible capacity.

The Diamond Concrete Machinery Company recently secured a plant at Cardington, Ohio, which will be operated as a branch factory. Sales offices are in the Tacoma Building, Chicago.

The machinery in the municipal power plant at Wiloughby, Ohio, may be disposed of shortly, as a private corporation has been granted the franchise for city service.

The Murray Automatic Boiler Feed Company, Detroit, has thus far had a very busy year in the sale of its patent regulator, which is now extensively used in power and heating plants.

A new manufacturing plant 60 x 120 ft., two stories,



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will be built shortly by the Fell-Lemen Trimmings Company, Detroit. Equipment details have not yet been worked out.

The American Electric Fuse Company, Muskegon, Mich., states that it has recently brought out a number of new specialties, which include starting devices for alternating current motors used in industrial plants. A standard line of direct current starters is also manufactured.

Martin Taylor is installing machinery in a new tile plant at Brown City, Mich. Another unit may be added later.

A Corliss engine with 32-in. cylinder and 18-in. stroke will be installed in the power house of the Continental Sugar Company, Blissfield, Mich.

Ahmeek Mining Company, Calumet, Mich., will hereafter be a larger buyer of machinery and repair parts, as a stamp mill for crushing ore has just been put in commission, and such an installation always increases subsequent expenditures for mechanical equipment.

The Everitt, Metzger, Flanders Company is clearing quite a number of brick residences from a site adjacent to its main plant in Detroit, for the purpose of erecting new shop buildings there, which will double its present capacity. Orders for the machinery which this will necessitate have, to a considerable extent, been already placed. Apparatus not yet purchased includes some electrical equipment.

The Northway Motor Company, Detroit, has arranged to install three transformers of 900-kw. capacity to take electric power from a central generating station and step it down to operating voltage for use in induction motors.

The new power plant of the Detroit Edison Electric Company, Detroit, includes as a part of its equipment two Stirling boilers of 2500 hp. each, furnished by the Babcock & Wilcox Company.

Plans for the plant of the Sommer Motor Car Company, to be erected in Bucyrus, Ohio, as recently mentioned, have been completed and construction work will be started at once.

It is stated on what appears to be trustworthy information that four large new shop buildings are to be added before October to the plant of the Cadillac Motor Car Company, Detroit.

Advices from Port Huron, Mich., are to the effect that the plant of the Port Huron Engine & Thresher Company, Port Huron, whose loss from fire was recently mentioned, has been taken over by the Havers Motor Car Company of that place.

The Burroughs Adding Machine Company, Detroit, is about to have work started on a new four-story factory, 80 x 240 ft., the general contract for which has been let to the Sterling Engineering & Construction Company, Milwaukee, Wis.

The Marquette County Gas & Electric Company, Ishpeming, Mich., is understood to be in the market for some new equipment, including a 500-hp. water tube boiler and accessories. Its present battery includes Babcock & Wilcox boilers.

Work is now under way on the Alden Sampson plant in Detroit of the United States Motor Company, which will comprise six buildings. These and the new factories for the Gray Motor Company, Brush Runabout Company and Briscoe Mfg. Company, which are all controlled by the same corporation, will be completed before fall.

The Campbell-Kingsley Mfg. Company, Detroit, is erecting a plant at Wyandotte, Mich., which it expects to have completed and ready for operation by August 15. The company manufactures pressed brass and steel goods, automobile parts, dies and tools, and is in the market for power squaring shears, folders, beading machines and eight or ten presses for sheet metal work of various sizes.

The United States Board & Paper Company, Carthage, Ind., will improve its plant by the installation of a cross compound condensing engine, a condensing plant and a vacuum plant.

The Cole Motor Car Company, Indianapolis, Ind., has taken over the three-story building formerly occupied by the Reliable Auto Exchange. The building has three floors, 50 x 200 ft., and will be used exclusively as a painting and finishing department.

The Detroit Auto Specialty Company, Detroit, is erecting an addition to its plant for the manufacture of automobile sheet metal parts, and is in the market for sheet metal machinery, punch presses and extra toolroom machinery. The company will also install a small forge department.

The Detroit Steel Products Company, Detroit, manufacturer of the Detroit-Fenestra solid steel windows, is arranging for a further extension to its plant, for which additional equipment will have to be provided.

A \$10,000 fire loss is reported by the Detroit Valve & Fitting Company, Wyandotte, Mich. The foundry equipment, patterns, table saw, motor, elevator, &c., were destroyed. The company has already started rebuilding and has temporary headquarters in another building.

The American Lubricator Company, Detroit, has let con-

tract for a factory, 50 x 200 ft., two stories, with a wing for a foundry, 55 x 85 ft. It will be of brick and steel construction and equipped with the most up to date machinery obtainable for the manufacture of the company's lubricating specialties. The company will soon be in the market for a line of Monitor lathes, grinding and polishing machines, metal separators, cutters, tumbling barrels, &c.

The Packard Motor Car Company, Detroit, has installed in its new foundry a No. 36 Newton cupola made by the Northern Engineering Works. The latter firm is also building for the Packard Company an electric traveling Northern crane.

The Marshall Furnace Company, Marshall, Mich., manufacturer of Wolverine furnaces, has increased its capital stock from \$100,000 to \$150,000 for the purpose of making additions to its plant. The building details are now being worked out and considerable equipment will probably be required for the improvements.

### Milwaukee

MILWAUKEE, WIS., June 6, 1910.

With very few exceptions, the market for machinery here is strong. In many different sections of the country a renewed buying movement appears to have been simultaneously inaugurated, and within the past fortnight some of the heaviest orders of the year have been received. In pending negotiations, also, there seems to be involved an aggregate amount considerably larger than any which has been known for six or eight months. This applies to propositions that can be designated as active, with many more which are regarded as good prospects.

In recent sales, power and electrical machinery has again been the most prominent, and among the buyers are public service corporations, operating central power and lighting plants, electric traction lines, pumping stations, hydraulic power transmission systems, &c. Quite a number of these have just disposed of issues of securities on terms much more favorable than could be obtained a few months ago. A feature of importance is also the fact that, in probably a majority of cases, such issues have been made with the specific consent and approval of the various State boards which have been given jurisdiction over public utilities, such as the Wisconsin State Railroad Commission. This supervision, with its attendant investigation into the conditions affecting properties, gives investors a confidence in securities which they would not otherwise have; and so valuable has such an indorsement been found that companies operating under governmental franchises are now seeking State control instead of evading or opposing it.

In some quarters the fear is expressed that anti-railroad legislation at Washington will counteract the benefits of the movement above mentioned and tend to throw the country into another period of uncertainty; but the consensus of opinion seems to be that the industrial advancement of the United States can not be retarded by differences between transportation companies and the Federal Government.

Machine tool builders are more concerned at present in the increase of their shop facilities than with booking orders, as nearly all of those located in Wisconsin have enough work in hand to last them for a good many months. Outside dealers are, however, very active. The houses directly represented here have reaped a harvest of orders lately from concerns engaged in or planning new construction. Sales of new tools largely predominate. Second-hand machinery of modern design can be readily placed, and very little such is offering. Inquiries at other nearby markets, such as Chicago, Detroit and Cleveland, have shown apparently similar conditions ruling there. Lists of considerable length are obtainable, but local users do not seem to discover in these many machines that will suit their purpose. The Clearing House which *The Iron Age* now publishes has been found of considerable service in this connection, for the reason that the tools usually listed are such as manufacturers are most apt to want.

Milwaukee foundries and forge shops have, of late, been so occupied with term contracts that ordinary custom work goes begging. The writer knows of one job which was hawked about town for over a week before anyone could be found to undertake making the necessary castings and forgings. Several concerns went over the blue prints and made estimates on the cost, as a matter of business courtesy, but they bid high in order not to take the work, stating frankly that they preferred to have it placed elsewhere. There probably are foundries in this vicinity that want work. If so, and they would advertise that fact in some manner to bring it to public attention, manufacturers and others in need of castings would be glad to know it.

The Wisconsin Mfg. Company, Jefferson, Wis., has let the contract for an addition to its plant.

## THE MACHINERY MARKETS

The Fairbanks-Morse Company, Beloit, Wis., supplied a gas producer plant and gas engines for the municipal service plant which has just been put in operation at Portales, N. M.

The Halcomb Steel Company, Syracuse, N. Y., which is represented here by R. W. Roberts, has introduced its new Ketos tool steel in most of the largest machinery building plants and some very interesting results are being demonstrated.

Through the efforts of local commercial interests a company known as the National Gauge & Register Company, which manufactures supplies for the automobile trade, will build a factory in La Crosse, Wis. The company's headquarters are stated to be in Minneapolis.

Machinery for development work will be erected this week on the property of the Little Minnie Mining Company, Benton, Wis., which will be in the market by fall for some further equipment.

The Rundle-Spence Mfg. Company, Milwaukee, has purchased ground adjacent to its present plant, in order to provide for future expansion. Plans for a new building will be prepared some time this summer, but the company is not now prepared to announce any details in relation to it.

The Optimo Mining Company, Linden, Wis., is figuring on an enlargement of its concentrating plant to a capacity of 100 tons daily. The project has not yet, however, been definitely determined upon. When it is carried out electric power will be used.

The E. L. Essley Machinery Company, whose headquarters are in Chicago, is devoting considerable attention to this market and has had a good trade here of late. J. R. McDonald, the vice-president and secretary of the company, is regularly located in Milwaukee, having an office at 222 Grand avenue.

It is reported from Fond du Lac, Wis., that the Standard Metal Mfg. Company, whose headquarters are given as Chicago, may establish a foundry at the railway terminals in North Fond du Lac to turn out castings on contract for the Soo Road.

The Berlin Machine Works, Beloit, Wis., has recently received a good run of orders from the vicinity of Spokane, Wash., where it is represented by A. N. Peel.

The plant of the Radcliffe Mfg. Company, West Allis, Wis., which was doubled in capacity some time ago, will be still further extended later in the year.

The machinery plant of the Prescott Company, Menominee, Mich., is again working to its full capacity.

The Briggs & Stratton Company, Milwaukee, has completed its new factory for the production of gasoline engine igniters.

The Lack Malleable Iron Company, recently organized at Paducah, Ky., has purchased a plant owned by Racine, Wis., interests and will remove the machinery to Paducah to be operated there.

The Standard Foundry Company, Racine, Wis., will erect a brick and steel addition 30 x 100 ft., to be used for core making.

A pumping unit of large capacity, to be operated by electric power, has been ordered by the Green Bay Water Company, Green Bay, Wis., in order to provide increased capacity. An elevated steel tank to hold 300,000 gal. will also be erected.

A steel frame kiln, which makes the eighth put in service, has been added by the Union Lime Works, Grimms, Wis.

The Manitowoc Boiler Works Company, Manitowoc, Wis., has taken up the manufacture of converters and ladles for Bessemer plants.

Boilers and other apparatus to be used in a heating plant, ventilating system, &c., will be required for a new public building at Mankato, Minn., the plans for which are being prepared by Chandler & Park, Racine, Wis.

The Vinegar Hill Mining Company, Benton, Wis., has placed an air compressor outfit in service at the Unity mine and is installing other machinery, including hoist, all of which will be operated by electric power.

The Chain Belt Company, Milwaukee, is finding an unusually good market for its interlocking chain belt on the Pacific Coast, where it is represented by the Meese & Gottfried Company in San Francisco, Los Angeles and Seattle, and by the Industrial Engineering Company in Portland.

The Badger Four Wheel Drive Auto Company is planning the erection of a factory at Clintonville, Wis., but the arrangements are not complete and no equipment has as yet been decided upon.

A new steel frame shop building, 60 x 140 ft., will be constructed by the Racine Boat Company, Racine, Wis. Contracts for the machinery have been nearly all placed.

The A. O. Smith Company, Milwaukee, which recently placed in operation at its new works a producer plant, large gas engine and electric generator, has arranged to utilize the waste heat from the engine for shop heating and other purposes,

by means of apparatus especially constructed for that purpose.

The Wallace Mining Company, Highland, Wis., will erect a 100-ton ore reduction plant. Little machinery needs to be purchased, as equipment previously in service at another mine has been secured.

O. C. Melgaard & Son, Cashton, Wis., have bought the Welker Marble Works at Sparta, Wis., and may install some new stone working machines a little later on.

The car shops which Ringling Brothers maintain at Baraboo, Wis., are to be doubled in capacity and new tools installed.

Representatives of the Power Specialty Company, New York have been here for the past week making preparations to turn the new incinerator plant over to the city. Official tests, now being run, are reported to show very satisfactory results.

From Chippewa Falls, Wis., it is reported that John C. Hansen, who is not otherwise known here, has had plans prepared for a plant in which to manufacture a special patented lock.

The Hanson Furniture Company, Janesville, Wis., is arranging for a new woodworking plant of considerably enlarged capacity. Inquiry develops the fact that all of the machinery required has been contracted for.

The new factory building to be erected by Chas. Skidd, Racine, Wis., plans for which are now being prepared, will be three stories, 60 x 120 ft., of mill construction. A steam plant will be installed, but whether power is to be applied through shafting or by means of an electric generating set and motors has not yet been decided.

The Leo Hofmeister Company, Milwaukee, has let contracts covering a new two-story factory 118 x 285 ft., for which a steam plant and considerable mechanical equipment will be required.

The Wisconsin Incubator Company, Racine, Wis., is preparing to extend its manufacturing facilities. The first new structure will be a factory building 50 x 200 ft., two stories, followed by a large warehouse.

A boiler, engine, dynamo and electric motors will be required for a three-story factory 50 x 150 ft. which the Helmholtz Mitten Company, Milwaukee, is arranging to build at Cudahy, Wis.

The Worden-Allen Company, Milwaukee, has taken one of the largest contracts ever awarded here for structural iron and steel to be used in shop buildings, being 3300 tons for the new car building plant of the Milwaukee Electric Railway & Light Company.

A two-story steel frame addition, 80 x 120 ft., will be made to the factory of the Hilker-Wichers Mfg. Company, Racine, Wis. Work on the foundation has already commenced.

A new factory to cost \$350,000 will probably be erected in the near future by the Hummel & Downing Company, Milwaukee, which has been looking for a suitable site.

The D. J. Murray Mfg. Company, Wausau, Wis., is erecting a fireproof addition to its machine shop, 60 x 425 ft., and a three-story office building 30 x 60 ft. The company has just completed a new foundry, 70 x 140 ft., power house, and a three-story pattern vault 35 x 140 ft. Additional machinery will be purchased which will increase the capacity of the plant 100 per cent.

The Gisholt Machine Company, Madison, Wis., will remove its Warren shops to Madison. Plans of the company contemplate an expenditure of \$350,000 in new buildings and equipment, and the transfer of \$100,000 worth of machinery from Warren to Madison.

### The South

ATLANTA, GA., June 6, 1910.

The South is such a large territory, and its sources of demand are so variegated, that market conditions can be covered only in a general way. Even this is difficult at present, owing to conflicting reports arising from the experiences of companies engaged in different lines of selling. As a whole, however, the machinery trade may be said to have started in fairly well for June. While business in some of the cities presents an appearance that is rather quiet, as compared with some weeks ago, the factories are all very busy, and development work at interior points is being pushed just as much as ever. Mining operations, especially, show great activity.

Hydroelectric plant construction has also become an important factor in the situation, and its influence is felt along many more lines than would be apparent on the surface. For one thing, it has brought a great deal of new capital into the Southern States, and has made possible further investments in factories which can be electrically operated on power obtained at low cost. The resulting ex-



## THE MACHINERY MARKETS

penditures for equipment and supplies, for building operations, public utilities and living necessities, have been of general benefit to this section, helping to create a broader, more staple market for material of every kind, and, hence, for the machinery necessary in its production or use.

The Central Georgia Power Company, Macon, Ga., whose large hydroelectric plant on the Ockmulgee River is practically ready for operation, has taken up the matter of erecting substations. Current will be transmitted at 60,000 volts and stepped down for use in motors at industrial plants, as well as lighting service, in communities reached by the transmission lines. The equipment contract has been let to the Westinghouse Electric & Mfg. Company.

At the Atlanta office of the Babcock & Wilcox Company, which is in the Candler Building, attention is called to the rapidly growing use of both superheaters and mechanical stokers in connection with Southern power plants, indicating a general rise in the quality of the apparatus now required.

The contract for a water works system at Eustis, Fla., for the Eustis Water, Light & Power Company, has been let to Walton & Wagner, Atlanta, Ga.

It is reported from Loveland, Ky., that the Loveland Light & Water Company is building a public service station, machinery for which has been purchased.

C. W. Hill & Co., Birmingham, Ala., are agents for Pawling & Harnischfeger Company, Milwaukee, Wis., in the sale of electric traveling cranes. The demand for apparatus of this character has been very strong at Southern industrial centers, but recently is falling off. Orders booked, however, are sufficient to keep the crane builders busy for some time to come.

The construction of a municipal pumping plant is under consideration at St. Petersburg, Fla., but a bond issue will need to be authorized before any steps are taken towards the purchase of machinery.

Some new equipment, including a screening plant, will be installed this season by the Cheney Marble & Lime Company, Chepultepec, Ala.

As a result of the attention now being paid to fire protection for new factories in the South, G. M. Davis & Son, Palatka, Fla., are doing a large business in tanks for sprinkler systems.

Plans for a power development of 18,000 to 20,000 kw. on the upper reaches of the Tugaloo River are being made by the Atlanta Hydro-Electric Company, recently formed for the purpose, which has offices in the Candler Building, Atlanta, Ga.

It is reported from Winston-Salem, N. C., but without direct confirmation, that the P. H. Hanes Knitting Company will erect an elevated steel tank and install boilers, steam pumps, &c., for a water supply and fire protection system.

The project for an electric service plant at Clinton, N. C., seems to be an assured fact, as the Samson Power Company, recently organized there, has acquired a site and is preparing to begin construction.

Plans have been ordered made for a pumping plant to be operated by the city of Danville, Ky.

The Chattanooga Car & Foundry Company, Chattanooga, Tenn., in addition to a large output of castings for work of different kinds, is receiving liberal orders this year for dump cars to be used in mining and other industrial service.

Some new machinery is expected to be bought this summer for the city water plant at Timmonsville, S. C., including possibly the complete replacement of present units.

Cameron & Barkley, Charleston, S. C., who handle centrifugal pumping machinery in various parts of the South for the Morris Machine Works, Baldwinville, N. Y., have found this type more generally specified of late for water works, power plant and industrial service than in any former year. In fact, the market for it is broadening from one month to another.

The municipal power plant at Cullman, Ala., which has a present capacity of about 100 kw., will be enlarged by the addition of one or more new generating units. It already has one reserve engine and 200 hp. in Cole boilers.

Le Sourd & Turner, Birmingham, Ala., find this a particularly good year for the sale of pumping outfits. They are agents for the Epping-Carpenter Company's line.

Funds are being provided for the enlargement of the city lighting station at Dalton, Ga., which is at present equipped with a Westinghouse generator coupled to an engine built by the Harrisburg Foundry & Machine Works, Harrisburg, Pa. A much larger unit will be purchased. Some new equipment for the water works is also needed.

From Newton, Miss., it is reported that the Batesville Mfg. Company will build a woodworking plant there. The company's present address is Batesville, Miss.

Representatives of the Ingersoll-Rand Company at Birmingham, Ala., are still very busy figuring on estimates for compressor plants, drills, hoists and other pneumatic de-

vices, for which the demand in the South seems to be steadily increasing. The installations already made this year are more numerous than for any previous period of considerably less length.

Action is expected to be taken shortly on the proposed construction of a municipal power plant at Orlando, Fla. As, however, the city is already served by a 300-kw. plant which the Orlando Water & Light Company maintains, this project is not likely to be carried.

The hydroelectric plant of the Paulding County Power Company, Dallas, Ga., which will be equipped with two alternating current generators of 500 kw., driven by turbine wheels, is nearly completed. The power will be used chiefly to operate motors in industrial plants. J. R. Gordon, general manager of the company, has offices in the Candler Building, Atlanta.

A new boiler and engine have been placed in service by the H. M. Smith & Sons Company, Lexie, Miss.

It is reported from Nashville, Tenn., although without direct authentication, that interests identified with the Southern Motor Car Company, contemplate establishing an automobile factory there.

The Augusta-Aiken Railway & Electric Company, which has a combined steam and hydroelectric plant aggregating 3000 kw., will install additional boilers and a steam turbine unit of 1000 kw. The boilers now in service were furnished by the Babcock & Wilcox Company, New York.

A large timber cutting plant and planing mill will be constructed at Hosford, Fla., by the Graves Lumber Company, De Funiak Springs, Fla. Considerable machinery will be required.

The Pratt Engineering Company, Atlanta, is reported to have taken contract for a large chemical plant and phosphate works to be constructed by the Reliance Fertilizer Company, Savannah, Ga.

The Robert Hill Machine Works, Dalton, Ga., destroyed by fire, will, according to an unconfirmed report, be rebuilt and extended.

The Municipal Engineering & Construction Company, Chattanooga, Tenn., has been awarded contract for a motor driven centrifugal pumping set and construction of a sewage system at Belzoni, Miss.

The Economy Oil Cup Company is a new incorporation at Augusta, Ga. The company is at present having its newly patented oil cups made under contract, but contemplates establishing its own manufacturing plant in Augusta. Its officers are Eugene M. Crozier, president; M. C. Dowling, treasurer; F. E. Courtney, secretary, and Harry E. Fitzgerald, general manager.

The Dixie Foundry Supply Company, Chattanooga, Tenn., which is one of the new Southern selling agencies recently mentioned, reports a rapidly increasing business and excellent future prospects.

The Atlanta Metal Bed Company, Atlanta, Ga., recently incorporated, has purchased the new iron bed factory of the Ware-Hatcher Furniture Factories and will operate it on full time. The company is in the market for 11 spindle gang drills.

The city of New Decatur, Ala., which has in operation a filtering plant of 1,000,000 gal. capacity, has arranged to add one more filter. L. B. Wyatt is superintendent.

E. N. Camp & Sons, Moreland, Ga., have incorporated and are increasing their facilities for manufacturing agricultural implements. They also operate a general foundry and machine shop, and this department will also be added to. At an early date a planing mill will be erected on an adjoining site. Practically all of the machinery for the mill has been bought, but molding machines for the foundry are yet to be provided.

The Livingston Light & Power Company has been incorporated at Livingston, Tenn., with \$15,000 capital stock, to develop a hydroelectric plant at that point. A 75-kw. generator and 15-in. turbine wheel are among the list of requirements. The H. E. Speyer Company, Algood, Tenn., are the engineers and contractors.

### The Northwest

MINNEAPOLIS, MINN., June 6, 1910.

Sales of machinery or materials used either in construction or public utility work continue to occupy the attention of manufacturers and dealers in this section; but the activity of the demand from such sources is also forcing consideration of the necessity for enlargement of shop capacity. Consequently the latter will, in their turn, provide a greater market for foundry apparatus, machine tools, power generating sets, air compressors and innumerable details of works equipment, which will be felt to a very considerable degree in the near future. At quarries, crushing plants, cement block, brick and tile factories, woodworking shops, &c., the situation is the same also as that which confronts

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operators in the metal industries, and for all of these lines an immense quantity of apparatus of various kinds will be needed during the year. Extensions or new plants recently completed are already filled with orders, and more are offering than can be accepted. As a result many contracts which would ordinarily be let locally for material of the class above referred to have to be filled elsewhere. Representatives of outside houses, however, do not seem to be as anxious as they were to get business, and prompt deliveries are becoming more and more difficult to obtain. Taken altogether, therefore, the situation is one to force the growth of home industries, and it is mentioned here at some length because of the bearing which it has upon the future of the market.

The largest contract for steam boilers let in the Northwestern States or Provinces for some time past has been awarded the Muskegon Boiler Works, Muskegon, Mich. It covers 12 high pressure units, each 72 in. by 18 ft., with Dutch oven settings, breechings and stacks. With each setting the company's new Ashley steel casing will be used. In the contract, which comprises equipment for the mills of the Big River Lumber Company, Ltd., Big River, Sask., there will be a steel frame refuse burner 37 ft. in diameter and 143 ft. high, making it among the largest ever erected, and other apparatus. An interesting feature of the burner is the fact that it is water jacketed and will heat the boiler feed.

The Northern Welding & Mfg. Company, Minneapolis, which represents the Davis-Bournonville Company, New York, in this part of the country, has established a service for the benefit of contractors and others engaged in field work that obviates long or costly delays in repair work, as welding with a portable oxy-acetylene outfit can be very quickly accomplished. Cutting beams, columns, &c., is also a feature of the service.

The Widell Company, Mankato, Minn., whose air compressor house and crushing plant were recently burned, will not need to buy new equipment, as the machinery can again be put into service.

The Minneapolis Motor & Truck Company, Minneapolis, has purchased ground upon which to erect a factory for turning out commercial vehicles, but building plans have not as yet been fully decided upon.

The Great Falls Water Power & Town Site Company, Great Falls, Mont., is completing a hydroelectric plant of 32,500-kw. capacity, in which six turbine wheels built by the S. Morgan Smith Company, York, Pa., will furnish the power to drive electric generators. Each is to operate under a head of 100 ft. at 225 rev. per min., and will develop 7200 hp.

Among the types of apparatus for which there is the greatest demand at Northwestern points, pumping engines, driven by gasoline power, are prominent. The Watrous Engine Works Company, St. Paul, had an excellent trade in such units during the spring months, and the opening of summer finds it, if anything, more active than before.

The Veerac Motor Company, Anoka, Minn., has let contract for a factory building 60 x 210 ft., which will be equipped with a line of modern tools. Gasoline engine power is to be used.

The Homestake Mining Company, which has the largest ore reduction plant in the Black Hills district, is planning enlargements which will call for considerable new machinery. The project for a large water power plant to furnish current for operating motors in the mills will also be pushed. Headquarters of the company are at Lead, S. D.

John Sauer, Huron, S. D., has advertised for bids on the construction of a three-story factory building there. No mention is made of equipment.

Plans for a water works system have been approved by the authorities at Belle Fourche, S. D., and the project will soon be carried into effect.

Considerable buying of mechanical and electrical equipment of various kinds will be done this summer for the account of the Aberdeen Street Railway Company, Aberdeen, S. D., which has just let contracts for five miles of line.

The hydroelectric plant at Red Lake Falls, Minn., which has a capacity of 175 kw. in General Electric alternators, driven by Dayton and Globe turbines, was recently sold to the Red River Power Company, which will largely extend the present development. A higher dam is to be built and units of 2000-kw. output installed.

The city of Tyndall, S. D., will erect a power plant to be equipped either with two crude oil engines or a gas producer and two gas engines, direct connected to electric generators. Some auxiliary machinery is also to be purchased.

The Helwig Mfg. Company, St. Paul, is finding an extensive market, not only in the Northwest, but also among shops, foundries, fabricating plants and contractors elsewhere in the country, for its pneumatic hammer. Features of this include a very simple valve mechanism and locked handle.

The activity in structural steel, bridge and tank work

through northern Montana and Idaho, as well as adjacent districts, is strongly reflected in the Great Falls Iron Works, Great Falls, Mont., which is being compelled to gradually extend its shop and foundry facilities in order to keep up with the current demand.

Nils C. Brunes, Minneapolis, who recently put in operation a new flooring factory, will find it necessary to install additional tools by fall, if the demand keeps up at its present rate. Other concerns in the same line of woodworking, whose product is favorably known, are similarly situated.

A bond issue for the installation of water works was recently authorized at Harlowton, Mont.

Corrugated metal culverts, which form the principal product of the Harris Culvert Company, Minneapolis, have come into such extensive use this year that production facilities are being severely taxed to keep pace with the requirements of the communities now making road improvements. This is getting to be a very prominent feature of local industry.

Plans for water works have been prepared at Cody, Wyo., and the project will be actively taken in hand before fall.

At Grand Rapids, Minn., the authorities have under consideration a large hydroelectric development to supplement or replace the present municipal power plant, which has a capacity of 150 kw.

The Caledonia Mining Company, Wardner, Idaho, which recently installed an Ingersoll-Rand air compressor, has arranged to drive it in future by means of an electric motor, and as further developments necessitate machinery it will be similarly operated.

The Eagle Iron Works Company, Minneapolis, successors to the Eagle Iron Works, has been incorporated for the purpose of increasing its capacity and equipment. The company has been established in the machinery business for more than 30 years and makes a specialty of repairing machinery, printing presses, steam and gasoline engines, pumps, &c. Elevators, mill and factory supplies are also carried in stock.

### The Central West

OMAHA, NEB., June 6, 1910.

Municipal buying has again become the principal support of the market. Steam, gas or oil engines, water wheels, governors, generators, motors, pumps, switchboards and auxiliary apparatus in considerable variety constitute a large percentage of sales recently made, and from present indications it will be even greater during the next six or eight weeks. This, however, simply serves to swell the aggregate volume of business transacted, for the reason that buying in behalf of industrial plants, central stations, electric railways and construction work, the last named of which has broken all records, is not perceptibly diminishing. Acceptance on the part of municipalities and county boards of bids made by Eastern manufacturers deprives local machinery houses of the benefit of a good deal of the increase in trade, but they are getting a fair proportion of it, often in the form of complete contracts.

Preparations for handling and moving this season's crops continue to bring a great deal of work to shops at various central and local points, as well as to make drafts upon dealers' stocks, especially in the line of shafting, belting, pulleys, clutches, &c. Repairs for cultivating, harvesting and threshing machinery are also being hurried, and almost every westbound way freight carries consignments of agricultural apparatus, including gasoline engines for farm work.

Among the manufacturing plants of this section which have been most crowded with orders is that of the Baker Ice Machine Company, Omaha. The early spell of warm weather created an uncommonly strong demand for apparatus used in mechanical refrigeration, and this has kept up very steadily, with no signs of any let-up during the summer.

An electric power and pumping plant will be installed at Coalville, Utah, by the Coalville Water Works & Power Company, recently organized there for that purpose.

An electric plant may be built by fall at Elm Creek, Neb., either by the community or a private company, as the Commercial Club is promoting the project.

The Iowa Engineering Company, Clinton, Iowa, is in charge of plans for water works at Corydon, Iowa.

Preparations are being made at Rippey, Iowa, for the installation of a high pressure water system, involving the use of an air compressor or multistage pump.

Plans have been practically completed and a tool list will be issued before long for the new car shops, including a large planing mill and woodworking plant, to be built by the Union Pacific Railroad Company at its Omaha terminal.

New boilers and pumping machinery for the water system at Fort Robinson, Neb., will be supplied by the Healy Plumbing & Heating Company, St. Paul, Minn.



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The Stearns-Roger Mfg. Company, Denver, Colo., is meeting with marked success in the introduction of the Wetherill magnetic process of ore separation.

Considerable increased facilities will need to be provided by the Kimball Bros. Company, Council Bluffs, Iowa, for next season's output of steam and electric elevators, if the demand continues to grow in the same proportions that it has lately. For the past three months inquiries and sales have been very heavy, due to the large extent of building and remodeling operations.

The Dubuque Gasoline Engine Company, Dubuque, Iowa, is remodeling a local plant formerly devoted to boiler making, and will install machinery suitable to its industry.

The Dart Auto Truck Company, which has heretofore had interests at Anderson, Ind., will build a new plant at Waterloo, Iowa, and remove to that point.

The Des Moines Bridge & Iron Works has taken contract for a pumping plant and water works system at Breda, Iowa.

The installation of pumping machinery for city water service and fire protection is advocated by the business men of Silver City, Iowa. Arrangements for a plant will undoubtedly be made this summer.

The Morrison Crusher & Mining Machinery Company was recently organized at Colorado Springs, Colo., to establish a plant for the manufacture of a new type of crusher patented by B. L. Morrison.

The municipal power and lighting station at Nephi, Utah, which now contains an hydraulic turbine of 150 hp., built by the Pelton Water Wheel Company, San Francisco, driving an alternating current generator, will be considerably enlarged. New and heavier machinery is to be purchased.

It is proposed, with the assistance of the local mining interests, to put in a pumping plant and system of water distribution at Carbondale, Colo.

Preliminary plans are being made for municipal water works at Underwood, Iowa, but construction has not yet been authorized.

A four-story factory building, 75 x 105 ft., will be erected in Dubuque, Iowa, by the H. B. Glover Company of that place. Considerable mechanical equipment will be needed.

A building which will include machine shop for repair work is to be erected in Omaha this summer by the Everitt, Metzger, Flanders Company of Detroit, Mich., manufacturer of automobiles.

An electric generating plant and machine shops for repair work will be constructed in the vicinity of Sheridan, Wyo., by the Sheridan Railway & Light Company of that place, which has started to build a new electric line to the coal fields. Equipment will be contracted for in the near future.

Work on a municipal water plant has begun at Fort Lupton, Colo.

The contract for a large steel bridge to be built over the Platte River at Valley, Neb., has been awarded the Canton Bridge Company, Canton, Ohio.

Another pumping unit is to be installed this year at Winnebago, Neb.

Preparations for the erection of a concentrating plant and mill, which will be electrically operated, are in progress on the property of the Golden Sun Mining & Milling Company, near Central City, Colo.

Funds have been provided for a water works system at Guernsey, Wyo., construction of which will be determined upon shortly.

Free & Taylor, Salt Lake City, Utah, have installed a large compressor plant near Park City, to be operated by electric current from a water turbine plant on Snake Creek, and will start work with machine drills on a 14,000-ft. tunnel for the Snake Creek Mines & Tunnel Company. A considerable quantity of mechanical equipment and material of various sorts will be required during the progress of this heavy piece of work, which has been instituted in order to get at extensive ore bodies underlying the mountain.

The Crane Falls Power & Irrigation Company will build a pumping and power plant at Crane Falls on the Snake River, about 15 miles southwest of the town of Mountain Home in southern Idaho. The plant will have a total capacity of 14,000 hp., and will be used for irrigation, light and power purposes. It is expected that future plans will arrange for the running of transmission line into the mining regions of northern Nevada. Smith, Kerry & Chace of Toronto are the engineers. The plant is expected to be in operation by the first of next year.

### The Southwest

KANSAS CITY, Mo., June 6, 1910.

The machinery market continues to hold firm, with demand very evenly distributed. In the line of foundry equipment and shop tools Oklahoma and Texas offer the best

opportunity for sales effort, although considerable activity also prevails in this immediate vicinity. As a rule, apparatus of a wide range of service is most wanted. Orders seldom cover more than one to three machines at a time, but enough of this trade has developed to make it well worth going after. Private reclamation work, which comprises irrigation in the arid or semi-arid regions and drainage in the low districts along the rivers or bayous, is calling for a great deal of mechanical and electrical equipment; so much so that a number of large machinery and supply houses are paying close attention to that line of trade. One means of keeping in touch with new projects of this kind is through the industrial departments of the various railroad companies. In order to get this information, however, calls should be made upon the officials concerned in encouraging the work, as they are already overburdened with correspondence and not disposed to take on any more than is necessary.

Drilling machinery, both for oil and water, is continuously in demand, but a few concerns have almost the monopoly of this business, which is done on special terms, namely, part cash and part notes. The rigs usually include power machinery, and most of them are portable.

Among recent jobs to which the Wiederholdt Construction Company, St. Louis, Mo., refers with pride is a tapered chimney 150 ft. high and 7 ft. in diameter, built for the Commonwealth Steel Company, Granite City, Ill. This is lined and covered with fireclay, making it practically indestructible.

The Houston, Texas, office of the Westinghouse companies is introducing for the use of structural steel and bridge contractors in the Southwest a small steam driven compressor which can be attached to and fed directly from the boiler of a hoisting engine or other similar unit, making it very convenient for field work.

The city of Conway, Ark., has engaged engineers to prepare plans for a modern high duty pumping plant and water distribution system. Machinery is expected to be purchased about August 15.

Among the busiest of selling agencies in the farther Southwest is the office maintained at El Paso, Texas, by the Sullivan Machinery Company, which has recently experienced a very active period figuring on the requirements of mining companies, especially in Arizona, New Mexico and the northern districts of old Mexico.

The Petroleum Iron Works Company, Sharon, Pa., is handling the work in this territory from an office at Tulsa, Okla., which has become the center of important industrial operations. Steel plate construction of every character continues in heavy demand through the Southwest, and Eastern firms are getting a fair share of the business.

The electric plant at Brownsville, Texas, will be enlarged and improved by the city. An oil engine is now used to drive the dynamo.

Owing to numerous changes which have taken place this season in the mining districts around Joplin, Mo., the American Concentrator Company of that place has considerable second-hand machinery to offer.

A new pumping plant adequate to the present needs of the community is to be installed in the near future at Waco, Texas.

The United Iron Works, Springfield, Mo., has made extensive sales lately of machines for refrigeration in sizes from one to six tons capacity. This, however, constitutes only one of a number of lines that are very active at the present time.

The J. S. Worley Company, Kansas City, has been engaged to plan a water works system for Coldwater, Kan., and prepare specifications, including machinery.

It is probable that motor-driven centrifugal pumps, capable of delivering water at high pressure, will be installed on the docks at Port Arthur, Texas, for fire protection by the Kansas City Southern Railroad Company.

The construction of a pumping station, with large storage reservoir, is under consideration at Big Springs, Texas.

It is reported from Chanute, Kan., that the Atchison, Topeka & Santa Fé Railroad will construct a large water supply station there, equipped with modern pumps and other machinery to be electrically operated.

The electric light plant at Dexter, Mo., was built by the city, but is now operated under lease, will be enlarged and improved. It has a present capacity of 90 kw., comprising a General Electric generator driven by an Atlas engine.

The Helmers Mfg. Company, Kansas City, has placed an order with the Wagner Electric Company, St. Louis, for a large line of alternating motors to drive machinery in its shops.

Another pumping unit of large capacity will be provided by fall for the city water works at Topeka, Kan.

Plans for a large central compressor plant for serving its several properties are being made by the Superior & Pittsburgh Mining Company, Bisbee, Ariz.

The Faeth Iron Company, Kansas City, has had plans

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drawn for a five-story building to be devoted to the manufacture of heavy hardware.

Among contracts recently taken by the American Water & Light Company, Kansas City, is one for a complete municipal water works plant at College Grove, Ore.

A large air compressor, electrically driven, is about to be installed in the power house of the Copper Queen Consolidated & Mining Company, Bisbee, Ariz.

Installation of pumping machinery is under consideration by the authorities at Fulton, Ark.

The Independence Electric Company, Independence, Kan., which operates a power plant of 1000 kw., is about to install another 500-kw. unit driven by a gas engine which the H. M. Strait Mfg. Company, Kansas City, is building. This represents the first engine of that type to be constructed in the Strait plant, which will henceforth give gas power users in the Southwest the benefit of additional competition.

From Murfreesboro, Ark., it is reported that a company known as the Little Missouri Water Power Company has been organized to build one or more hydroelectric plants in that vicinity. Definite details are, however, lacking. The address of the company is given as Prescott, Ark.

The Henderson-Sturges Piano Company, Fort Worth, Texas, which has a piano factory at Anniston, Ala., is reported from there to have decided upon building a new plant, for which machinery will be required. The main structure is to be 60 x 200 ft., with separate power house, dry kilns, &c. An automatic sprinkler system will be installed.

The Morris Mfg. Company, T. C. Morris, president, has been organized in Little Rock, Ark., to establish a plant for the manufacture of sawmill machinery.

A motor driven hoist will be installed this summer by the Zacatecas Mining & Metal Company, Zacatecas, Mexico.

Charles J. Johnson, owner of the Palacios Machine Shops, Palacios, Texas, will install tools for automobile repair work.

An electric power and lighting plant of considerable size will be built in the near future by the city of Cherokee, Okla. One or more new pumps may also be needed.

The Kansas City Material Company, recently organized, of which W. H. Coffery, Kansas City, is president, will soon complete a large crushing plant near Independence, Mo. The initial equipment has been ordered, but more will be needed later.

The East Enid Implement Mfg. Company, recently organized at Enid, Okla., will build a factory 120 x 150 ft. Equipment has not yet been provided.

It is reported on what appears to be reliable authority, but without official authentication, that the 400-kw. power plant of the Tucson Gas, Electric Light & Power Company, Tucson, Ariz., will be considerably enlarged and improved.

H. Brockelmeyer, Temple, Texas, has closed a contract with the Board of Trade of Cleburne, Texas, for the removal of his foundry to Cleburne. The plant will be capitalized at \$30,000 and its present capacity more than doubled.

The Stone & Webster Engineering Corporation, Boston, Mass., contractors for the Galveston-Houston Electric Railway, Houston, Texas, now under construction, will in a short time begin the construction of a power station, details of which are being worked out at the Boston office of the corporation.

The Monsanto Chemical Works, St. Louis, Mo., has purchased a block of land in that city, on which it will erect factory buildings as an addition to its present plant.

Charles A. Zilker and associates, San Antonio, Texas, have awarded a contract for the erection of a cold storage to cost \$200,000. The plant will be five stories and will have 300,000 cu. ft. of storage space. A gas producer engine will be used for power.

The Cooper Machinery Company, St. Louis, Mo., has been incorporated with a capital stock of \$12,000, to carry on business as manufacturers' agents.

G. Mosen is preparing to put up a new foundry and machine shop at El Paso, Texas.

C. Mailander & Son are erecting a plant at Waco, Texas, the main building of which will be 100 x 165 ft., two stories and basement, for the manufacture of bank and store fixtures. Each machine will be driven with individual electric motors. Most of the machinery has been provided for, but some extra equipment will be needed for a dry kiln which will be added later.

C. W. Parker, manufacturer of amusement devices, Abilene, Kan., has plans prepared for erecting a branch factory at Leavenworth, Kan. The new building will be 125 x 200 ft., four stories, of reinforced concrete construction, and is expected to be in operation before January 1 next.

The city of Cherokee, Okla., H. J. Titus, Mayor, is advertising for bids covering complete power plant equipment for an electric light and water works system. Two engines with corresponding boilers, two pumps, two dynamos, a

water tower and tank and other miscellaneous equipment will be required. There has been appropriated \$38,000 for this work and \$15,000 more for the completion of the city's sewerage system.

A water works and electric lighting system will probably be installed by the municipality of Arapaho, Okla., some time during the summer. The O'Neil Engineering Company, Dallas, Texas, is preparing plans. M. C. Main is Mayor of Arapaho.

### North Pacific Coast

TACOMA, WASH., June 3, 1910.

Boilers are almost certain to constitute one of the best selling of any of the heavier lines of apparatus during the coming six or eight months or more. Power plant extensions and the use of higher steam pressures are relegating to the scrap heap numerous boilers which have heretofore given good service, and the tendency is to buy a much better grade of apparatus than in former years. In this demand are, of course, included considerable subsidiary equipment, such as oil burning furnaces, regulators, economizers, feed water heaters, superheaters, feed water pumps, circulating pumps, condensers and the like. Boiler shop tools, whether hydraulic, motor-driven or pneumatic, together with power machinery, compressors, cranes, hoists, &c., are also to be largely required in the near future, for reasons similar to those above cited, and the further fact that the railroads will need them in the shops now being laid out at various points. Much of the purchasing on this account will be, or has already been, done in the East, but dealers in the Coast cities can get a good share of it.

The Seattle Oxy-Acetylene Company, Seattle, Wash., is showing photographs of a four-ton engine bed and frame, broken in service at the Mumby plant in Olympia, Wash., which was quickly restored to its former condition by means of the welding process. To metal working plants and machinery users generally they are making the suggestion: "See us before scrapping that broken machine or tool you thought was done for."

A large new plant, electrically operated, will take the place of the Turner Lumber & Mfg. Company's mill at Wallace, Idaho, which burned some weeks ago. The plans for equipment, however, have not yet been fully worked out.

The Link-Belt Company, which is located in the New York Block, Seattle, Wash., carries what is stated to be the largest stock of riveted and detachable chains on the Coast.

The installation of a water works system has been decided upon at Conconully, Wash.

V. V. Clark, whose work in connection with the Bunker Hill mining properties is well known, has opened an office as consulting engineer in the White Building, Seattle, Wash.

A very light type of gasoline engine, which is adapted to aeroplane service, as well as for motor boats and automobiles, has been put on the market by the Afloat Motor Company, 1019 Third avenue, Seattle, Wash.

The property of the Iron Dyke Copper Company, Homestead, Ore., which has been under lease, recently reverted to its owners, and some additional machinery for development work may be installed.

The Northwestern Iron Works, South Seattle, Wash., is selling more oil engines this season than ever before, both for marine and stationary service, as a result of the increasing use of oil for fuel. These are manufactured in sizes up to 200 hp. and can be used for driving pumps, hoists, dynamos or belting. They operate on any kind of oil.

Work is just starting on another large hydroelectric plant for the Portland Railway, Light & Power Company on the Clackamas River. It will be some time before machinery needs to be provided.

The Roslyn Fuel Company Roslyn, Wash., will install a Parker boiler of 300 hp. and other power equipment.

Among Eastern manufacturers not directly represented on the Coast, who are making a vigorous campaign for business here, is the Coe Mfg. Company, Painesville, Ohio, which has been selling this year largely to the veneer plants.

An electrically welded split steel pulley, made without rivets and having adjustable bushings, is being featured in the sales of the Meese & Gottfried Company, Seattle, Wash.

The Columbia Engineering Works, Portland, now has in operation its new plant at Linnton, Ore., which is equipped with an extensive line of modern tools, capable of handling anything in the way of machinery, sheet metal work, &c.

Rock crushing machinery and other equipment will be provided in the near future for one of the plants of the Washington Brick, Lime & Sewer Pipe Company, Spokane, Wash.

The Phoenix Iron Works has just completed shipments from Portland, extending over several weeks, on a large order for castings for the Grays Harbor & Puget Sound Railway.



## THE MACHINERY MARKETS

One of the most important deals made on the Slope this season is the purchase by the Columbia Power & Light Company, a new organization, of properties heretofore operated by the Northwestern Corporation, of Walla Walla, Wash., at that place, Yakima, Lewiston and Pendleton. Under the present management these plants will be gradually improved, and considerable purchases of machinery are likely to result.

With the closing of its Seattle office, recently mentioned, the headquarters of the American Woodworking Machinery Company on the Coast have been established in Portland, Ore., where J. B. Ettinger is in charge of the work. Stocks are maintained at a number of places.

A factory is to be erected in Bellingham, Wash., by the newly organized Northwestern Wheel & Wagon Company, for the purpose of manufacturing a patented type of wheel.

Among orders recently taken by the Portland Iron Works, Portland, Ore., is one for the complete machinery equipment of the Butte Falls Lumber Company, Butte Falls, Ore.

The Walking Wheel Traction Company, Inc., Spokane, Wash., J. W. Wooley, president, is formulating plans for erecting a plant for the manufacture of its patent vehicle wheel. No equipment details have as yet been worked out.

The machine and boiler shops of the Union Iron Works, Spokane, Wash., were seriously damaged by fire May 20. The loss is estimated at \$75,000, half covered by insurance. Repairs are in progress.

### San Francisco

SAN FRANCISCO, CAL., June 2, 1910.

Local foundry and machine shop operators feel more optimistic in regard to labor conditions. As a result of several conferences between representatives of the operators and the unions, it has been decided that work will go on for the time being under the eight-hour schedule, pending further negotiations. It is believed that within a month or two the workmen will grant certain concessions from their previous demands, which will not only avoid a conflict, but will remove a part of the handicap under which the San Francisco manufacturers have for some time operated. This outcome is not fully assured, and there is still a tendency on the part of the larger machine shops to postpone purchases of new equipment. Sales of machine tools in the interior and southern California continue fair, though the business consists for the most part of small orders. The most frequent inquiries are from manufacturers of dredging, pumping and oil well machinery. The demand for transmission equipment in the territory tributary to San Francisco is fully up to normal.

Sawmill and woodworking machinery are rather quiet. Most of the large installation now in progress is covered by contracts placed some time ago, while second-hand equipment is available for most of the small projects at low prices. Conditions are encouraging in the line of construction machinery, both heavy and light. Sales of steam shovels in this territory are becoming more frequent. Figures are being taken by many counties and towns in California for road machinery, rollers, &c., and equipment for handling concrete and asphalt. Numerous small inquiries are received for rock crushers, but comparatively little business is resulting at the moment. Some large contracts for cement mill equipment have recently been let in the north, but there appears to be an overproduction of this material in California, and manufacturers are cutting down their purchases. The outlook is good for the sale of locomotives, which have been in fair demand for logging roads, and are coming into more general use than ever before by the larger industrial interests of the State.

Notwithstanding frequent inquiries for mining machinery, few orders are being placed in the local market by California and Nevada interests. The foreign demand, however, is increasing, with a considerable volume of new business from Mexico and South America, as well as the Orient.

Many orders are coming in for pumping machinery of all descriptions, for water works and irrigation projects as well as oil interests. Small water pumping units are in constant demand for agricultural purposes, most of them being run by gasoline or electric power. Larger units are required for oil transportation, and as southern shops are working about at capacity on such equipment more orders are being placed at San Francisco. Facilities for moving oil from the points of production are now far below the output, resulting in a sharp increase in the volume of business. San Francisco will soon be in the market for more machinery for the auxiliary water system.

The California fruit canners have purchased more machinery than usual this spring, and are still in the market for boilers and general supplies. The introduction of the new sanitary cans has caused a general demand for new sealing devices.

The Merchants' Association of San Francisco has pre-

pared a directory of all manufacturing industries in the vicinity of San Francisco. According to this publication there are 1003 plants in San Francisco, 241 in Oakland and Berkeley, 16 elsewhere in Alameda county, 35 in Contra Costa county, 14 in San Mateo county and 22 at other nearby points.

The Pullman Company has sent instructions requiring that its new car shops at Richmond, Cal., be increased beyond the lines of the original plans.

The Union Gas Engine Company has moved its office and city salesroom to the quarters at 503-505 Mission street, recently vacated by the Berger & Carter Company.

Henry F. Lyon, formerly with Baker & Hamilton, has opened offices in the Monadnock Building, San Francisco, as representative of E. Keeler & Co., water tube boilers.

The Mercantile Box Factory, San Francisco, has installed a 250 hp. Corliss engine and a 200 kw. generator, and is putting in individual motors to operate its machinery.

Santa Clara County, Cal., will shortly purchase a number of power road rollers.

The town of El Centro, Cal., will receive bids June 14 for a municipal waterworks plant, including pumping machinery with a capacity of 1000 gal. per min., valves, hydrants, &c.

The Hume-Bennett Lumber Company is preparing to install a steam pumping plant for fire protection at its yards at Sanger, Cal.

A project is under consideration for enlarging the capacity of the Riverside Portland Cement Company's plant at Riverside, Cal.

It is reported that the Idaho National Harvester Company, Moscow, Idaho, is preparing to double the capacity of its plant.

The Alaska Perseverance Gold Mining Company, Juneau, Alaska, has authorized the erection of a large stamp mill at its mine.

The Perry Dredging Company and the Mokelumne Mining Company are preparing to build gold dredges near San Andreas, Cal., this summer.

Plans are being prepared for a large power house to be erected shortly by the South Side Light & Power Company in San Francisco.

H. E. Holmes, of San Francisco, is preparing to open a branch machine and automobile repair shop at Redwood City, Cal.

The Pacific Pulp Paper & Products Company, with offices in San Francisco, is proceeding with its plans for a large plant at Eureka, Cal. Figures are being taken on machinery, and it is proposed to have the first section completed by next fall.

The Santa Fe Railroad has ordered a new ferry steamer for use on San Francisco Bay from the Union Iron Works. It is announced that the boat will be the fastest on the Bay, and will cost over \$400,000.

The Imperial Valley Oil & Cotton Company, El Centro, Cal., has decided to place orders for its projected gins and oil mill as soon as possible.

The Atchison, Topeka & Santa Fe Railway Company has closed the contract for the erection at San Bernardino, Cal., of a car repair shop 120 x 512 ft.

### Government Purchases

WASHINGTON, June 6, 1910.

Major George McK. Williamson, constructing quartermaster, U. S. Army, Fort Mason, San Francisco, Cal., will open bids June 15 for a complete electric lighting system to be installed at Presidio.

James Knox Taylor, supervising architect, Treasury Department, Washington, D. C., will open bids June 20 for one high pressure boiler, with all accessories, for installation in the Post Office Building, Baltimore, Md.

The Bureau of Supplies and Accounts, Navy Department, Washington, opened bids May 31 for the following:

Class 31.—For furnishing and installing one gasoline engine at Hingham, Mass.—Bidder 32, James Craig, New York, \$10,500; 74, Fairbanks, Morse & Co., New York, \$4927; 86, G. & W. Mfg. Company, New York, \$4943; 98, Charles J. Jager Company, Boston, Mass., \$5872; 123, McCay Engineering Company, Baltimore, Md., \$4863; 150, Otto Gas Engine Works, Philadelphia, Pa., \$7500 and \$8959; 184, Sheffield Gas Power Company, Kansas City, Mo., \$5953.75; 210, St. Marys Machine Company, St. Marys, Ohio, \$5000.

Class 121.—One hoisting engine—Bidder 16, the H. L. Bond Company, Boston, Mass., \$1325; 66, Exeter Machine Works, Pittston, Pa., \$875; 114, Lidgerwood Mfg. Company, New York, \$995 to \$1125; 110, Lenher Engineering Company, New York, \$1110; 120, J. H. Leonard & Co., \$1150; 225, Williamson Brothers Company, Philadelphia, Pa., \$1198.

Class 200.—Two electric motors—Bidder 58, the Diehl Mfg. Company, Elizabethport, N. J., \$1052; 72, Fort Wayne Electric Works, Fort Wayne, Ind., \$938; 77, General Electric Company, Schenectady, N. Y., \$2244; 98, Holtzer-Cabot Electric Company, Brookline, Mass., \$1715.44; 190, Sprague Electric Company, New York, \$1100; 202, B. F. Sturtevant Company, Hyde Park, Mass., \$1863.90.

Class 201.—Four induction motors—Bidder 8, the Burke Electric Company, Erie, Pa., \$405; 76, J. Faessler Mfg. Company, New York, \$396; 222, P. W. Walter, Norfolk, Va., \$372.60.

# The American Foundrymen's Association

## Fifteenth Annual Convention

DETROIT, MICH., June 7 (*By Telegraph.*)—The attendance at the convention of the American Foundrymen's Association in session this week in this city is the greatest in the history of the organization. Over 1500 had registered on Monday, and substantially the same number had secured official badges before the close of office hours on Tuesday. It is expected the week's registration will approach 7000, if it does not run into five figures.

This extraordinary outpouring of foundrymen not only emphasizes the tremendous interest in these meetings, but foreshadows rapid future development in foundry practice. This is the fifteenth annual convention of the parent organization, and it is 15 years since that body last met in Detroit. At that time it had 250 members, and there was possibly an attendance of half that number. To-day there are 753 members, while outside foundrymen are arriving from all sections of the United States and Canada to take advantage of the meetings.

### The Exhibits

The officials and members of the Foundry and Manufacturers' Supply Association have exerted themselves no less strenuously than the officials of the affiliated foundrymen's bodies to make this a record breaking meeting. Practically all the exhibits were installed and in operation on Monday, a gratifying accomplishment when the dilatoriness of previous years in this regard is remembered. These exhibits occupy 30,000 sq. ft. of floor space and represent approximately 100 concerns. There are 24 new members in the association this year. The exhibits include everything needed in a foundry, with particular attention devoted to molding machines and kindred labor-saving and cost-reducing equipment.

Great interest is shown in each exhibit, the buildings being constantly crowded. Owing to the considerable expense involved in the installation of many of these power exhibits, the question is being agitated by some of a separation of the Foundry and Manufacturers' Supply Association from the American Foundrymen's Association and the establishment at some central point of a permanent location with suitable buildings for holding annual exhibitions, irrespective of the meeting place of the technical body. President F. E. Perkins believes that if the funds are permitted to accumulate until after the 1911 meeting the surplus would be sufficiently large to aid in financing an exposition building. The matter will be discussed at the annual meeting of the organization this week.

### The Opening Session

Mayor Breitmeyer of Detroit, and President Larned of the Board of Commerce, delivered addresses of welcome at the opening meeting Tuesday morning. This was conducted jointly by the American Foundrymen's Association and the American Brass Founders' Association. J. S. Seaman of Pittsburgh responded. He said that he was the oldest past president present, and that he enjoyed the distinction of having attended all the conventions since he became a member.

Arthur T. Waterfall, president of the American Foundrymen's Association, in his address dwelt on the rapid development and progress made in foundry practice in the past 10 years, especially calling attention to the investigations and experiments in the use of permanent molds and the development of the electric furnace, which he considered the two most important questions before the foundrymen of America to-day.

In closing, he stated that the resolution to raise the annual dues from \$5 to \$10 had been passed by a great majority.

William R. Webster of the American Brass Founders' Association, in his presidential address, pointed out the need of classified data and the limited information obtainable on the art of casting nonferrous metals. The report of W. G. Corse, secretary and treasurer of the organization, showed an increase in membership from 206 to 273 during the year. He reported that the Committee on Standardization of Alloys had been working with the United States Bureau of Standards, and he recommended that the committee also co-operate with the American Chemical Society and the American Society for Testing Materials. He described the steps that were being taken with the view of obtaining a definition of trade terms for the non-ferrous industry.

### Report of the Secretary-Treasurer

Dr. Moldenke presented his report as secretary-treasurer as follows:

Ten years have now elapsed since the American Foundrymen's Association was good enough to entrust me with the executive work pertaining to this office. From the splendid nucleus of foundry pioneers constituting the society at the time my energetic predecessor turned over this work to me, a great association has developed, the like of which may be found nowhere in the world. Go where you will among the civilized nations of the earth and you will find us well known, not only for the excellence of work done, but more particularly for the spirit which animates the membership to give freely of experience and advice to those who search for advancement, without desire of recompense—yes, often to a possible business detriment.

When contrasted with the liberal minded who see in the advancement of the industry as a whole a direct gain to the world, and who do their share either in work or by contribution, or oftentimes both, how small is the individual who sits by without helping, but just the same appropriates any ideas that come along for his advantage. We need more men of broad views. An industry embracing such an enormous number of foundries as North America can show should give us members by the thousand instead of hundred.

Yet we have done well, and with so many warm-hearted members standing behind the organization there is little wonder that it is looked to as representing the most advanced practice, as furnishing the debating ground for proposed changes in method, as furthering the betterment of employee and employer alike; for on the broad platform of honesty and truth there is no division. The success of our association is primarily due to its individual members, and long may they hold their friendship and regard for it.

### THE INTERNATIONAL TESTING CONGRESS.

In the past year I found it necessary to go to Europe twice. The first time was right after the convention, the strain from Cincinnati having proved so heavy that it became a question of health to get away, and I combined a visit to the western and central parts of Europe with some interesting investigations into the industrial situation of the countries in question. Beginning at Christiania, the trip took me through Stockholm, Copenhagen and Berlin; thence through the iron districts of western Germany to Brussels; then to Paris, Marseilles, the beautiful Riviera, Florence, Eternal Rome, Naples, and home. While in Copenhagen, besides meeting the redoubtable Dr. Cook of North Pole fame, I attended the International Association for Testing Materials congress, at which our vice-president, Walter Wood, and a few other well-known American scientists were present. Mr. Wood and I represented the United States in matters relating to cast iron, and the friendships cemented with the famous Englishmen, Germans and men of other nations whose names are household words in iron circles, will remain bright spots in my life. From the opening exercises in the presence of the royal family to the closing banquet at Elsinore, amid the booming of guns, it was a wonderful and withal instructive gathering, as the result of which, so far as cast iron is concerned, we are getting closer on the several questions of international specifications.



## SOCIOLOGICAL INVESTIGATIONS.

During this trip, at the instance of the United States Government, I also gathered information on the subject of accidents in mines and factories, industrial insurance, and more particularly the complete laws in force in the several countries visited, as related to these subjects. These have all been turned over to the respective authorities, and as I took occasion to travel slowly and where I could speak the language, in third class carriage, I got into conversation with fellow travelers and thus learned more of the social conditions than could be got in any other way. For the student of political economy, and particularly one who has the welfare of his country deeply at heart, this information was highly interesting. It showed that not only here do we have the mad race for luxury with all the attendant evils, with God knows what is yet to follow, but also in staid Germany, frugal France and Belgium, are the conditions exactly the same, from the highest in the land down to the poorest peasant. If we add to this cases that I found where men pay out 15 per cent. of their annual income in taxes so that war armament, royalty, &c., are kept up, it is little wonder that there is a cry to get back to nature again.

## GERMAN AND AMERICAN FOUNDRY PRACTICE.

The second European trip was a short one, for business in foundry matters, and I took occasion to look particularly into the difference between German and American foundry practice. The foundrymen of North Germany were good enough to call upon me for an evening's talk, and a great assemblage of foundrymen and engineers from all over North Germany were pleased to listen to a general talk on American foundry practice.

If I can point to but one great difference in practice, it is that Germans—and, I understand, the English also—make their castings entirely for the work intended, no matter if the machine shop kicks about hard castings. If they want wear they make their castings in accordance therewith, and no excessive machine shop costs, as we might think them, are allowed to stand in the way. A little of this method would do us good here, where the foundryman is constantly on thin ice when he sends out his castings to a machine shop. We are too much after soft castings here, as you all can testify.

Further, when going into the question of pig irons, strange to say their better brands—and more expensive ones—are all of the rather lower silicon varieties. Quite evidently they still believe in paying high for an imported metal that has a name for making strong castings. Some day the fact that other irons with low silicon will do the same will be recognized, and then our practices will get closer together.

## INCREASED ASSOCIATION DUES.

To turn now to internal affairs. The association now has 753 members, which number excludes those who are in bad standing and cannot be got to pay up their annual dues. What effect the raising of the annual dues to \$10 will have remains to be seen. Let us hope that it will not materially affect the membership, particularly as it is the intention to enlarge the *Transactions*, and to furnish a bound volume at the end of the year. This action, now that the vote has passed it, was highly necessary, for although the books show a balance, if the absence of the secretary for three months in Europe had not meant that the association was under no expense during that time, there would probably have been a deficit to show. This will be noted from the expense now necessary for convention arrangements, and the enormous work of the office, requiring, as it did, the round sum of \$500 in postage.

## FINANCES.

The finances of the association are as follows:

Balance from last year.....	\$28.64
Income during year.....	2,940.00
Total.....	\$2,968.64
Expense for Transactions.....	\$1,178.53
Printing.....	135.75
Postage.....	500.00
Salaries.....	900.00
Convention expenses.....	222.47
Sundries.....	11.61
Total.....	\$2,948.36

This leaves a balance of \$20.28 to report to the association.

The work on special investigations is moving along, reports not being ready at this time for publication. The laboratory of Mackintosh, Hemphill & Co., under the direction of our H. E. Field, was good enough to analyze all our molding sands for us, credit for this work belonging to F. H. Daniels, chemist. The fund has a balance of \$340.42, as only \$2.97 was expended during the year, and that for freight, &c.

I conclude my report with expressing my thanks again to my many friends who at Philadelphia presented me with that token of esteem, which besides forming a permanent monument for my after life, also made possible this magnificent European trip; to the members of the association, my

warmest thanks for their forbearance and uniform courtesy during these 10 years of service, and the assurance of my faith in the future of our great industry and the kindest of feelings toward our membership, whom I hope long to serve if they so wish it.

At the conclusion of Dr. Moldenke's report, which showed an expense of only \$1900 for salaries during the year, it was suggested by Mr. Seaman that, in view of the fact that a salary of \$1200 is allowed the secretary and treasurer by the association, they insist upon the acceptance by Dr. Moldenke of the balance due.

Major Joseph T. Speer of Pittsburgh presented a resolution to petition President Taft to appoint Dr. Joseph A. Holmes director of the newly created Bureau of Mines, which was carried, and the secretary was instructed to telegraph the President the sentiment and action of the association.

The only paper read at this meeting was prepared by Steelman Stephenson of Detroit, on "Acetylene Oxygen Repairs in the Foundry," which was exceedingly interesting.

## Tuesday Afternoon Session

The Brass Founders opened the meeting at the afternoon's session with a paper by Erwin S. Sperry, Bridgeport, Conn., on "Fluxes as Applied to the Brass Foundry." This developed considerable discussion, which took the line of the relative value of rock, salt, plaster of paris, &c., as fluxes. It was essentially an experience discussion.

Charles R. Stevenson of New York read a paper on "Brass Foundry Costs and Statistics." Benjamin D. Fuller, superintendent of the Westinghouse Electric & Mfg. Company, Cleveland, followed with his paper on "Foundry Efficiency." Thomas D. West spoke at length on the subject of the prevention of accidents. Henry Cave, president of the Autogenous Welding Equipment Company, Springfield, Mass., gave an illustrated lantern slide lecture on the welding process of his company, the illustrations showing all kinds of castings that had been repaired.

A smoker is being given to-night by the Detroit Foundrymen's Association to the visiting members and guests, and on Wednesday afternoon a boat ride up the Detroit River will be given. Thursday evening a banquet will be held. Much praise is due the local Reception Committee for the efficient manner in which it has handled all the details of the convention.

**The Winona Technical Institute.**—Commencement at the National Trades Schools (formerly the Winona Technical Institute), Indianapolis, Ind., was held May 25, and diplomas were presented to 170 graduates by ex-Mayor Charles A. Bookwalter. Eighty were from the school of printing, 39 from the school of pharmacy, 22 from the school of lithography, and the remainder from the schools for molding, tile setting, brick laying and painting. Mr. Bookwalter, who now has the management of the institution, is proceeding enthusiastically with a plan for the rehabilitation and development of the school, which includes making it part of the Indianapolis school system and having it supported partly by a tax levy of 3 cents on \$100 of assessed property, in return for which the city shall be permitted to use the large grounds for a park and for sites for high schools and manual training schools. The plan has been approved by all the chief donors and creditors. The national trades organizations have agreed to continue their subscriptions to the support of the school.

Officials of the Westinghouse Air Brake Company, Pittsburgh, state that the company's business is at present running at a higher level than ever before in its history, and is also more profitable than ever. New business is appearing at a gratifying rate.

## The Pennsylvania Engineers' Convention

Second Annual Meeting at Harrisburg, June 1 to 3

HARRISBURG, PA., June 4.—The second annual convention of the engineers of Pennsylvania was held in the State Capitol in this city on June 1, 2 and 3, under the auspices of the Engineers' Society of Pennsylvania, whose headquarters are in this city. It brought to Harrisburg representative engineers from every county. Above 1200 engineers and their wives attended. The attendance, and interest were much more general than at the convention of last year, and the papers, while not as numerous as in 1909, covered a range of subjects of importance.

### A State Society of Engineers Favored

The most important feature of the convention was the general sentiment manifested in favor of the formation of a State society of engineers. This will probably be created next year with a code, and there is a possibility of legislative backing. Much discussion of this feature marked the sessions, and to facilitate the organization movement a form of constitution was adopted for county and local societies and assurance given that the engineers' societies of Philadelphia, Pittsburgh and Scranton would unite with the society in this city in the proposed general society. Assurances were also given that societies would be organized in Erie, Oil City, Bethlehem, York, Johnstown, Pottsville, Lancaster, and possibly Wilkes-Barre. These societies will be formed along the lines suggested.

The outline of the State society favors the creation of a body to be composed of delegates elected on the basis of one for every 40 members, these delegates to constitute the legislative body, the president and directors to form the executive organization. Annual conventions are to be proposed. In many respects the lines of the national societies in the engineering profession will be followed.

### Engineers Should Take a More Active Part in Public Matters

The keynote of the convention was sounded in two striking addresses, delivered at the opening of the convention. Both Governor Edwin S. Stuart and Mayor E. S. Meals had paid strong tributes to the work of engineers in the development of the resources of Pennsylvania and paved the way unconsciously for the call to the engineers to take a more active part in the problems of daily life.

Prof. John Price Jackson of State College, chairman of the convention, in his address, asked why engineers wrapped themselves up in their professions and allowed innumerable questions of public import to be answered by men of other walks of life. He made an earnest plea for interest in sociological problems. Said Professor Jackson:

The engineer is modest, and both in his meetings and at his home he avoids mixing in public questions or in movements to educate or influence public opinion. There are innumerable questions of vital import to the people of this country and of the world which can only be answered intelligently by the engineer or the industrialist. Why should the medical profession be alone held responsible for insisting upon proper systems of sanitation and water supply when the creation of proper methods and their execution lies so largely in the hands of engineers?

As a result of this discussion the convention provided for 12 committees on recommendation of a special committee headed by Colonel H. C. Demming of this city. These committees will work along lines of public enlightenment on the following subjects: 1, public structures and buildings; 2, lighting and power; 3, water supply and sanitation; 4, roads and highways; 5, railroads and waterways; 6, industrial education; 7, conservation; 8, telegraph and telephone communica-

tion; 9, mines and mine safety; 10, mineral lands; 11, legislation; 12, sociological problems.

President J. V. W. Reynders of the Engineers' Society of Pennsylvania, who is vice-president of the Pennsylvania Steel Company, stirred up considerable enthusiasm by his address on the share the engineer should take in public life. He said in the course of his remarks:

The responsibility for the intelligent and sensible development of American civic utilities has to a large extent been shifted by former generations to the present one. The annual stream of Americans traveling to Europe, causing a drain on the national wealth estimated at \$100,000,000 annually, is symptomatic of our neglect of intelligent civic development. We despoil nature everywhere, removing forests without replanting even a fraction of the cut; we erect factory buildings with no thought of proportion of outline, which costs nothing; we build checker board cities with little or no provision for parks; we allow sewage to contaminate streams; we suffer from sewerage systems which do not admit of extensions; we build country roads with no thought of grades or drainage, and always we sacrifice permanent results for temporary or private advantages. These defects of our past development place upon the engineer a two-fold duty, not only to design and construct in a far-seeing way such improvements as may be placed in his immediate charge, but to be prepared at all times to give intelligent direction and to assist in the development of an enlightened public sentiment on all matters pertaining to civic betterment or the public welfare.

### General Addresses

Two addresses were delivered on road construction. L. E. Boykin of the United States Department of Agriculture, Bureau of Highways, discussed present methods of building and the possibilities of asphaltum oils and cement. State Highway Commissioner Joseph W. Hunter discussed what Pennsylvania has done and urged that the engineers work for the enactment by the Legislature of a law which will permit of a system of main roads, connecting cities and county seats, doing away with the present system of local initiative, which ties the hands of the State and leads to "patch work" construction. He also declared that the State, not local supervisors, should maintain the roads in the interest of economy.

J. G. Callan, electrical engineer for the Arthur B. Little Company, Boston, spoke on "Rotary Blowers for Blast Furnaces," in the course of which he outlined the developments of the last decade and gave illustrations from furnaces recently equipped in this country. This paper was favorably discussed by the steel men present, being commented upon because of the references to the future. Among his illustrations was one of the original Cornwall furnace.

J. A. MacMurchie, designing engineer of the Westinghouse Machine Company, Pittsburgh, illustrated and described the Melville-MacAlpine reduction gear and Dr. Clayton H. Sharpe, director of the New York electrical testing laboratories, showed the loss in municipal lighting in old methods and the advantages of use of reflectors and placing of lamps. Dr. Sharpe presented illustrations of methods in Berlin and other cities in Europe.

H. G. H. Tarr of R. D. Wood & Co., Philadelphia, discussed by-products of gas tar, with some figures showing how profitable it can be made. One ton of coal, costing 65 cents at the mines, will produce 140,000 cu. ft. of gas, \$2.25 worth of sulphate of ammonia and \$1.25 worth of by-products.

A popular lecture on aviation was delivered by Prof. A. Lawrence Rotch, director of Harvard University's Blue Hill observatory.

The close of the convention was an address by State Commissioner of Health Samuel G. Dixon on sanitation.

Announcement was made that the next Legislature will be asked to make an appropriation to issue a map showing the peat and mineral beds of Pennsylvania. This work contemplates numerous surveys, tests and plotting.



### The Exhibit

The exhibit eclipsed that of last year's convention both in number of exhibitors and variety of exhibits. It was arranged in the concrete car barns of the Central Pennsylvania Traction Company, which were loaned for the purpose by President Frank B. Musser, and which formed a notable feature in themselves, as they are entirely of concrete construction, roofs and sides. The booths were arranged and exhibits installed under the direction of Mason D. Pratt, the engineer, who designed and constructed the barns. In addition to some of the best known firms in the country, the Pennsylvania Railroad, Pressed Steel Car Company and American Car & Foundry Company had exhibits on sidings. The Pennsylvania showed the first of the electric engines designed for use in the Hudson tunnels ever seen in this part of the State, one having been brought from the Westinghouse plant for the purpose. It was visited by thousands. The car exhibits were also notable, including dump and oil cars.

The exhibit was prolonged until June 4 to allow visitors from all parts of the State to see it.

The close of the convention was marked by an interchange of compliments, in which President J. V. W. Reynders of the Pennsylvania Society and F. Herbert Snow, chief engineer of the State Department of Health, former president, were warmly commended for the success of the gathering.

A. B. H.

### Personal

The Ready Tool Company, New Haven, Conn., has engaged as its sales manager Gorham C. Parker, who for the past three years has been connected with the William J. Smith Company, New Haven. Mr. Parker was successful in putting on the market and starting in the machinery trade the Jacobs chuck.

W. S. Rogers, president of the Bantam Anti-Friction Company, Bantam, Conn., is now on his annual pilgrimage in Germany, visiting with his allied companies there in the manufacture of steel balls and ball bearings and arranging for the coming year's contracts. He expects to attend the joint meeting of the American Society of Mechanical Engineers and the Institution of Mechanical Engineers of Great Britain in July.

Thomas Devlin, president of the Thomas Devlin Mfg. Company, Philadelphia, Pa., will sail June 11 for a three months' trip abroad.

August Marx, general manager of the Philadelphia Roll & Machine Works, Philadelphia, Pa., will sail June 21 for a trip abroad, which will cover several months.

Thomas Blagden, Jr., who has been a member of the New York selling staff of the Pennsylvania Steel Company for the past few years, has been appointed assistant sales agent in New England territory, his connection with the Boston office beginning June 1.

J. H. Moulton, heretofore at Gary, Ind., has been made blast furnace superintendent of the Southern Iron & Steel Company at Alabama City, Ala.

W. A. Hill, formerly superintendent of the Crown Smelting Company, Chester, Pa., but who resigned several years ago to accept a position with the Damascus Bronze Company, Pittsburgh, Pa., has returned to the former company in the same capacity.

L. Weimer Murray has resigned from Plitt & Co., iron and steel merchants, Real Estate Trust Building, Philadelphia, and accepted the position of district manager for the United States Metal & Mfg. Company of New York, with headquarters at Lebanon, Pa.

The Fort Pitt Bridge Works, Pittsburgh, with plant at Canonsburg, Pa., has secured a contract for the erection of a bridge over Thompson Run, near Turtle Creek, Pa.

### Customs Decisions

#### Floor Planing Machines Not Machine Tools

In deciding the classification of so-called floor planing machines, the Board of United States General Appraisers has drawn a distinction affecting in principle a large variety of articles. The test case arises under the tariff act of 1909, and stands in the name of F. W. Myers & Co., who act for the purchasers of the goods. The machines in question were returned by the customs authorities at the rate of 45 per cent. under the provision in the new tariff for "manufactures of metal not specially provided for." The contention raised by the importers was that a rate of only 30 per cent. accrues, owing to the claim that the planing machines should be classified as "machine tools," under paragraph 197.

The machine in question is a portable apparatus, resembles in form somewhat a lawn mower, and is propelled in about the same manner as one would use a carpet sweeper. It has a shaft in the working part to which is attached a series of planing knives of hardened steel. A small electric motor is attached to the apparatus, and by means of the power so applied the knives are caused to revolve at a great speed. The importers urged that these articles plane floors by machinery instead of, as formerly, by hand, and that they are within the ordinary meaning of the term "machine tools."

General Appraiser Fischer, who writes the decision for the board, does not agree with the importer's contention. He says that it is a simple matter to specify such articles as are not machine tools, while it is a matter of quite some difficulty to define what a machine tool is. The protest is therefore overruled. He says:

If an article of the kind we have before us is to be classed as a machine tool, then a meat chopper, vegetable slicer, automatic pencil sharpener, stone crusher, &c., must also be so regarded. If work now performed by machinery, instead of, as formerly, by hand, is to be the criterion, then a suction cleaner, automatic egg beater, sewing machine, loom and many other articles not tools would have to be so classed.

The decision says that in order to determine whether a floor scraper or planer is or is not a machine tool it will be necessary to fix with some degree of certainty the meaning of the words "machine tools" as used in paragraph 197 of the recently enacted tariff act. The general appraiser says that it is difficult to find a line clearly distinguishing tools from machines, this circumstance being due to the advance made in mechanical appliances. The decision states that a machine is ordinarily distinct from a tool, as it contains within itself its own guide for operation. Mr. Fischer says that it became customary where the tool was used in conjunction with a machine, and where the machine guided and directed the tool, to apply to the combined article the term "machine tool." As far as the board can ascertain, however, that term was only applied to such machines as performed the work of tools in workshops.

In discussing the interpretation to be given the new tariff, General Appraiser Fischer says in part:

Machinery is a term applied to mechanical combinations of parts for producing articles of commerce which may otherwise be, more or less, perfectly made by hand. If a machine tool is opposed to a hand tool, as machine work is opposed to hand work, then, in that sense, every machine, practically, would be a machine tool. But if every mechanical contrivance designed to effect a specific purpose or object was to be so regarded, it is clear to us that a more general term than "machine tools" would have been used by Congress to express that purpose. In other words, unless some distinguishing line is drawn, machine and machine tool are absolutely synonymous.

If Congress meant this, we think it would have used the more ordinary and better understood term machine or machines. Having used a different word, we hold that Congress meant to draw a distinction. In our opinion the provision must be read so as to include within its purview only such

machines as are workshop appliances and to perform the work of tools in such shops.

The decision quotes various authorities in support of the conclusions advanced by Mr. Fischer. Some of these authorities would restrict that term to such machines as are used in the manufacture of machinery. On this point, the decision says, that the board is not satisfied that it is necessary to limit the term to that extent, but the tribunal does believe that the term must be confined to such workshop appliances as perform the work of tools. The board reaches the conclusion that the goods in controversy do not answer the meaning of the term "machine tools" as used in the new tariff, and are consequently dutiable at 45 per cent. as assessed.

## Obituary

### W. P. BETTENDORF

W. P. Bettendorf, Davenport, Iowa, died June 3, aged 53 years, of acute intestinal trouble. He was born at Mendota, Ill., removing later with his parents to Missouri. At the age of 13 he obtained employment as a messenger boy at Humboldt, Kan., and two years later removed to Peru, Ill., to become a clerk in a hardware store. In 1874 he became a machinist's apprentice in the shops of the Peru Plow Company, where he served full time. After working in the shops of the Moline Plow Company, Moline, Ill., and the Parlin & Orendorff Company, Canton, Ill., he returned to Peru in 1882 to become superintendent of the Peru Plow Company.

He invented the Bettendorf metal wheel for agricultural implements, designed the special machinery for manufacturing it and superintended the business at Peru until 1886. With his brother, J. W. Bettendorf, he removed to Davenport, Iowa, and established the business which was incorporated as the Bettendorf Metal Wheel Company. In 1892 he invented and began the manufacture of the Bettendorf pressed steel gear for farm wagons, and in 1895 incorporated the Bettendorf Axle Company to carry on the wagon business. In 1905 this plant was sold to the International Harvester Company and Mr. Bettendorf concentrated his attention on the manufacture of steel car trucks and steel underframes as well as complete railroad cars. In this enterprise Mr. Bettendorf's mechanical genius and practical ability as a manufacturer soon won recognition from the leading railroads of the country, and this business now employs 800 men and comprises a steel foundry as well as a large equipment of special machinery. In 1902 these manufacturing interests were centered in a new plant at the town of Bettendorf, about 3 miles east of Davenport.

Mr. Bettendorf's genius has enriched the world by establishing four large manufacturing enterprises: the metal wheel plants at Peru and Davenport, the steel wagon business at the latter city, and the latest and largest of all, the steel car shops. Among manufacturers he was looked upon as a man of remarkable boldness and ingenuity in the invention and design of special machinery for working iron and steel, especially large hydraulic presses. He is survived by his father, now living in Bettendorf; his brother, J. W. Bettendorf, who has been associated with him for 25 years, and a second wife.

DORRANCE S. GODDARD, Worcester, Mass., for many years conspicuous in the wire industry of that city, died June 3, aged 80 years. He was a native of Worcester, the son of Benjamin Goddard, one of the founders of the Washburn & Moen Mfg. Company, now a part of the American Steel & Wire Company, being associated with Ichabod Washburn as his partner in the original venture in 1831. The family is prominent in the industry through three generations. Dorrance and Henry Goddard, the two sons of Ben-

jamin, held important positions in the Washburn & Moen Works, and Harry W. Goddard, the son of Dorrance, is the president of the Spencer Wire Company, Worcester, which business he has built up to large proportions. Dorrance Goddard learned the trade of wire drawer at the South Worcester mill, later operated by the Worcester Wire Company and now the Central Works of the American Steel & Wire Company. In 1862, in partnership with William E. Rice, he established a wire mill in Holyoke, Mass. In 1866 the business was sold to the Washburn & Moen interests, Mr. Goddard going to the Quinsigamond plant, now the South Works, as superintendent of the wire department, remaining in high official position until his retirement 10 years ago. He served his city in various public offices. Fond of travel, he made long journeys in this country, on various occasions crossing the continent, the first time in 1851. He leaves four daughters and two sons, Harry W. Goddard and Dwight Goddard, manager of the Cleveland Works of the Wyman & Gordon Company.

WILLIAM P. DAVIS, president of the W. P. Davis Machine Company, Rochester, N. Y., died May 30, after an illness of about four weeks, aged 60 years. He was born in Lima, N. Y., May 19, 1850, and received his early education in the public schools of Honeoye Falls. His strong mechanical instinct developed at an early age, and he was only a lad of 14 years when he sought work in a machine shop at Auburn. In 1872, when but 22 years old, he started a machine shop in North Bloomfield, N. Y., and a year later removed his business to Canandaigua, where he remained three years. In 1874 he returned to North Bloomfield. The business grew until it seemed necessary to secure the advantages of a larger town and in 1890 he removed to Rochester. In 1894 the W. P. Davis Machine Company was organized, with Mr. Davis as president. Three years later the present large plant was erected. It makes a complete line of machine tools, prominent among which are engine lathes. He leaves a widow and a daughter. His brother, Charles F. Davis, is secretary and treasurer of the company.

IGNATZ DROEGE, SR., Covington, Ky., died June 4, aged 82 years. He came to this country at the age of 21 from Westphalia, Germany, and took employment at the Licking Rolling Mills, Covington, then operated by Bush & Jordan. Later he formed a partnership with Charles Bogenschutz and operated a stove foundry. Later he acquired by purchase the property of the Licking Rolling Mills and with his two sons conducted the business successfully, withdrawing from active participation a few years ago. He was the father of 14 children, eight of whom survive.

JOHN C. CAMPBELL, Chicago, city salesman for the National Tube Company, died May 31, aged 53 years. He was born in Glasgow, Scotland, and educated at the Glasgow University, locating in Chicago 18 years ago. For the past 15 years he had been in the employ of the National Tube Company and for a time represented the Western Tube Company in Chicago.

EDWARD C. HEGELER recently died at an advanced age at his home in La Salle, Ill., after a brief illness. He was half owner of the Matthieson & Hegeler Zinc Company, but had been living in retirement. He was a native of Germany, locating at La Salle in 1856.

The Commercial Club of Cincinnati, Ohio, of which James A. Green of Matthew Addy & Co. is president-elect, spent the week end in an inspection of the Indiana Steel Company's plant at Gary, Ind. The club was entertained at a banquet at the Blackstone Hotel in Chicago by the Commercial Club of that city. The Gary plant was visited under the guidance of Captain H. S. Norton, president of the Gary Commercial Club, and E. J. Buffington, president of the Illinois and Indiana steel companies.



# The Mechanical Engineers' Convention

Atlantic City Meeting, May 31 to June 3, 1910

In the number of the attendance, the sixty-first semiannual meeting of the American Society of Mechanical Engineers held at Atlantic City May 31 to June 3, 1910, was a little disappointing. Only 138 members and 123 guests were registered. Nevertheless there was an unusual amount of interest taken in the papers and the extent of the discussion obtained was especially gratifying. The results justified the deliberate intention this time of selecting a place where there would not be opportunity for excursions to engineering enterprises in the vicinity such as there is where the spring meetings are usually held. The idea this time was to provide more time for the members to get better acquainted with one another, and to make the professional sessions themselves the principal attractions. The meeting held in Saratoga in 1903 was the last one where this idea was carried out. Two good reasons why the attendance was not larger at this meeting were the approaching joint meeting of the American Society with the English Institution in Birmingham, England, next month, to attend which some had to forego this meeting, and the fact that Atlantic City is a popular place of meeting for various other associations which are attended by members of this society. The hotel where the headquarters were maintained and the sessions held, the Marlborough-Blenheim, presented unusual facilities for the convention.

Among the papers which should be mentioned specially for the amount of discussion they provoked was the one by H. J. Freyn, entitled "Some Operating Experiences with a Blast Furnace Gas Power Plant," which was pronounced by several one of the most important papers that has been presented to the society in years, and the one by Prof. E. C. Schmidt on "The Resistance of Freight Trains." The programme of papers, as a whole, showed excellent discrimination on the part of the Meeting's Committee. They were so grouped that those who could not stay the entire time could in a day hear most of the papers in which they were specially interested. The Gas Power Section session was again the feature of the convention.

## FIRST SESSION

Tuesday, the opening day of the convention, was left entirely unassigned. The first professional session was held Wednesday morning in the hotel. The Secretary read the report of the tellers on the election of new members. This list comprised 67 members, 7 associate members and 71 junior members. The report of the tellers upon the vote on the amendments to articles C-10, C-11 and C-45 of the constitution was next read and announced the adoption of all three amendments. These have been previously referred to in earlier reports, as it is the requirement that the amendments be presented at a previous regular meeting. There was next heard the report of a committee of the Society appointed to investigate and report on the proposed bill for licensing engineers, which has recently come up in the New York State Legislature. Charles Whiting Baker presented the report, the sense of which is that the society is opposed to such legislation, and has asked the New York State Legislature to defer action until after this meeting, and to consult with representatives of national engineering bodies before drawing up and passing definite measures.

### The Shockless Jarring Machine

BY WILFRED LEWIS,\* PHILADELPHIA, PA.

The first paper was presented in abstract by the author, and is reprinted nearly in full in another

part of this issue. Written discussion was submitted by A. E. Outerbridge, metallurgist of William Sellers & Co., Philadelphia, Pa. Concerning a machine of the type described he declared that the shockless jarring machine is not only novel in principle but the value of this improvement will become more and more apparent with the increase in the size and capacity of the machines. The chief objection heretofore has been caused by the ground waves due to shock. If this trouble can be eliminated without the addition of any undesirable features, there is almost no limit to future development of the machine. At the present time castings which a few years ago could not be made on the jarring machines are successfully handled. In the Sellers foundry a jarring machine handles flasks weighing from 16,800 lb. to 20,640 lb. Aside from the lessened cost of molding these large castings on the jarring machine other advantages are uniform distribution of sand and uniformity in weight of duplicate castings. The chief objection to the operation of this machine is the "earthquake," which causes sand to drop in contiguous molds. To overcome this arrangements are now being made to adapt the shockless principle to the jarring machines already installed. Then it is believed that green sand molds with large overhanging portions can be safely made on the floor alongside the machine.

E. H. Mumford took exception to some of the criticisms in the author's paper of other designs. Tables characterized as flimsy he held were efforts to avoid unnecessary weight. Concerning the compacting of sand by jolt ramming he stated that proper mold density is obtained in the bottom of the mold before the top, and never does actually reach the top; hand ramming of the upper layer or providing excess sand to be later struck off are necessary. He declared that money is wasted on a machine to roll a mold by power when a crane will pick up any mold by the flask trunnions on which it has practically rolled itself by the time it is set down where it is wanted. He considered that the damage done by shock or jarring of the foundry floor by jolt ramming machines was exaggerated. A condition which he believes militates against the success of the machine described is that the load placed on the table of a jolt ramming machine is very seldom balanced over the plunger. The center of gravity of a sand mold is rarely in the vertical center lines of the flask and it is practically impossible to balance it on the machine table by the eye. As a consequence the plunger of a machine soon becomes badly worn and thereafter the heavy end of a loaded table will impact before the other. He further criticised the use of springs in Mr. Lewis's machine, maintaining that a reliable plunger compression is much more satisfactory.

F. W. Taylor compared experience with steam hammers and any machines having falling weights. He criticised the table advocated by Mr. Mumford as likely to produce laminations in the molds and commended Mr. Lewis's construction in this respect. Springs in the machine he considered are of advantage in serving to maintain some pressure between the flask and the table reducing the distorting tendency that comes with total release of pressure between the jolting parts.

### A Comparison of Lathe Headstock Characteristics

BY PROF. WALTER BAUTENSTRAUCH,\* NEW YORK CITY.

Many machines on the market have been redesigned to make the most efficient use of high-speed steels. These tools can be compared on many bases, but the one which the author believes the most satisfactory is that established on the basis of those characteristics of speed and torque which per-

\* President Tabor Mfg. Company.

\* Columbia University.

mit the most economical removal of shavings from a given class of material and a comparison of the speed and torque actually obtained with the standard characteristics will serve as a means for judging the efficiency of the headstock. In any machine a definite relation must exist between spindle speeds and accompanying torques that the machine may be adapted to efficient weight removal on all diameters of any material. The torque resulting from taking a cut varies directly as the diameter of the piece operated on and to keep the standard surface speed best adapted to the tools employed the spindle speed must be increased. The spindle speed varies inversely as the diameter of the work, and where it is desired to remove a maximum weight of shavings, the product of the speed and the torque should be a constant and the ideal speed-torque diagram is an equilateral hyperbola. This diagram may be used to determine the proper relations which should exist between spindle speeds and torque in a new design of lathe and also to determine the extent to which the speeds and torques of a lathe already designed conform to this standard. A number of lathes of different makers were selected and speed-torque diagrams plotted for each. An investigation of these diagrams showed that increasing the number of speeds regardless of the torque does not necessarily increase the lathe's adaptability to economical performance and that the amount by which the efficiency can be increased is not proportional to the additional speed changes provided.

This paper was presented in abstract by the author. Carl G. Barth spoke of the use of slide rules in calculations regarding lathes. With reference to gears he stated that the pitch diameter  $d$  for a 60-toothed gear

can be made equal to  $S \frac{60}{62}$  by the Brown & Sharpe formula, allowing the outside diameter to be equal to the pitch diameter of a gear of two more teeth:  $7.7 S$  is then the strength of the gear. Tools of proper cross section should be one-thirtieth the diameter of the swing. A formula for the horse power required by a lathe is often wanted; a good one he offered is one-third of the swing. The speaker concluded with a description of the use of his latest form of slide rule for calculating allowable speeds and other conditions of lathe running.

F. W. Taylor spoke of machine tools in the Bethlehem Steel Company, designed by John Fritz, which it had been Mr. Barth's and his work to examine from a modern standpoint. These were the only tools that proved equal to the demands of modern conditions and never broke down with high speed tools.

Oberlin Smith favored plenty of metal in designs and agreed that in stationary and slow moving parts too much metal cannot be provided.

#### The Strength of Punch and Riveter Frames Made of Cast Iron

BY PROF. A. L. JENKINS,\* CINCINNATI, OHIO.

This paper has for its object an experimental determination of the relations existing between the ultimate strength of curved cast iron specimens, similar to punch and shear frames, and the ultimate strength of ordinary test bars, and a comparison of the experimental results with those determined by the various methods of analysis used in designing castings of similar shapes. While the ordinary formulas assume that the stress in a beam is directly proportional to the load and factors of safety based on ultimate strength of the beam, this is not true, however, in the case of cast iron, because the stress is not directly proportional to the load. To prevent torsional moment due to eccentric loading, the specimens were provided with two small hemispherical projections for receiving the load. Round and rectangular test bars were cast with each specimen. A 100,000-lb. Riehle testing machine was used for making the test and two steel stirrups were held in the grips and received the castings. The tongs of the autographic recording device were placed between the casting and the stirrup, thereby eliminating the deflection of the stirrups and the bearing projections on the castings. In all 18 specimens were tested and the results showed that the unit tensile strength varied from 18,600 to 24,000 lb., and the bending strength varied from 36,400 to 46,400 lb. The conclusions drawn from these tests are that there is no rational method for predicting the strength of curved cast iron beams suitable for punch and shear frames, that the stress behind the inner flange at the curved portion is an important consideration which should be recognized by the designer, that no definite relation seems to exist between the strength of the curved cast iron beam and the transverse strength of a test bar cast with it, and that the Résal and Pearson-Andrews formulas are unwieldy and awkward in their application and offer many chances for error.

\* University of Cincinnati.

An abstract of this paper was presented by Secretary Rice, who also read a written discussion submitted by James Christie. The latter declared experiments of the author show the existence of serious stresses at the junction of thick and thin castings and explain the failure of some specimens at test loads one-third less than those of others where the estimated resistance was only 10 per cent. greater. Fairbairn and Hodgkinson observed this about the middle of the past century, and aimed to obviate it by a gradual tapering. Some lines of weakness have been observed in rolled I-beams, but it is generally believed that these internal stresses are relieved by molecular action in course of time. The author does not give the time which elapsed between the casting and testing of the specimens, and if the time was brief satisfactory results could not be expected. The discussor believes that a secondary stress occurs in the frames of this class of tools. In channel shaped clamps it has been observed that when the back of the clamp is weak in comparison with the arms, the former deflects inward when a distending force is applied at the ends of the arms. This has also been noticed in punching machine frames, and this inwardly acting transverse stress can be resolved into its resultant flange stresses. The levers through which the two opposing forces act are the distance from the end of the arm where the distending force is applied to the neutral axis of the spine and one which is half the length of the beam forming the back. Applying these assumptions to two of the specimens tested a total flange tension of 12,300 lb. was obtained, which agrees closely with the ultimate test loads obtained by the author. It can also be shown that the ultimate transverse strength of a rectangular cast iron beam is identical with that of a flanged section of the same depth and sectional area where the flange widths are about seven-eighths the depth and the web is a minimum.

Professor Rautenstrauch was surprised to find that the author's experience with cast iron frames of C-form led him to conclude that the Andrews-Pearson formula gave results that were absurd when compared with those obtained by experiments. He had a few castings prepared similar to ones shown in Fig. 1 of the author's paper, and tested them in a 100,000-lb. Riehle testing machine. His results checked accurately with calculations made by the Andrews-Pearson formula. In conclusion he called attention to the fact that the uncertain nature of cast iron and the impossibility of determining the effect of shrinkage stresses and imperfections in the castings involved a considerable element of doubt as to the proper working stress to be allowed, no matter what analysis of stress strain relations is used.

Frank I. Ellis of the United Engineering & Foundry Company had submitted a written discussion which was presented by the Secretary. He did not think anything can be gained by making sample curved sections such as had been done by the author of the paper unless they are made full size. It has been the experience of his company that even comparing different sized machines, the relative values compared with test bars are not at all the same. Their practice has been to design the member from a formula and then correct to suit experience.

Henry Hess maintained that it is not a question of formulas, but of yield point or elastic limit of the material. He referred to an instrument now in existence which shows by change of temperature when the elastic limit is reached. It consists of a delicate pyrometer in conjunction with a gold leaf electroscope, with which it is possible to explore a piece under test and discover the instant that the elastic limit in any part is reached by the very slight change in temperature rise which is then to be noticed.

Oberlin Smith gave it as his practice to regard a punch frame as a curved parabolic beam and in calcu-



lating the strength required in any section considers the moment of the force applied at the ends of the frame about the neutral axis at the point in question. By bending wire to conform to the outline of the frame he found that with strain applied as in a machine the tendency is for the outside and inside lines to separate. That this is true also of the cast frame was shown by the cracking of a web near and parallel with the neutral axis, and to prevent this it was necessary to thicken the web. He favors a box cross section rather than an I section.

Wilfred Lewis confirmed Mr. Smith in these regards and showed a typical cross section of a frame in which the sides of the box tapered in thickness, being thick toward the inside where the inner line of the curved frame is also thicker, being the part in tension, whereas the outer line being in compression need not be as thick.

A discussion presented by John F. Myers was accompanied with diagrams. His conclusions are that for solid sections of cast iron the common beam formula is more correct than those of either Résal or Andrews & Pearson; that such specimens fail at a stress approximately 86 per cent. of the ultimate tensile strength of the test specimens when computed by the beam formula; that the limited number of tests on solid sections and the small size of the specimens used still leaves room for considerable uncertainty as to the behavior of large castings, and that it is safest at present to continue to use the common or Unwin formula keeping the working stress between 1500 and 2000 lb. He regards the I-section frame improper, although quite commonly used. Such a frame should be stiffened by a diagonal rib at the bends of the frame or two ribs at those points as continuations of the throat horizontal and vertical inside flanges, so that the stress in the flanges might be gradually distributed.

Sanford A. Moss accredited the failure of some of the specimens at the junction of the flange and web to insufficient fillet, which nullifies any mathematical analysis. He had always supposed the three formulae mentioned practically equivalent differing only in minor corrections. The three points of uncertainty seem to be the fundamental criterion for a safe stress, the law of distribution of stress in a beam and the mathematical solution of the bent beam problem. He considered permanent set a good fundamental criterion, and that a part ceases to be useful when the permanent set reaches some certain amount, and this should be substituted for breaking stress. The mathematical formula may apply up to this point, but not up to breaking stress. He thinks also that the application of the maximum shear theory proposed by Guest and Mohr some years ago may be of value in the mathematical analysis of the bent beam. This contends that the maximum shearing stress at each point is the matter which must be investigated. A combination of these two points, he believed, giving as a criterion the shearing stress at which appreciable permanent set begins, would give a rational solution of the problem.

President George Westinghouse suggested that the time element may play a part, as castings in time adjust themselves to inherent casting strains and become stronger. Annealing, he suggested, would help eliminate this factor and alluded to the practice of annealing automobile cylinders between the roughing and finishing cuts.

John Fritz referred again to designing with plenty of consideration for strength by ample proportions, and told of the time when he decided to build a mill that would not break and the surprise manifested by the molders when they found he wanted the top boxes solid. The mill stood up and at one time even rolled rails after the middle roll was broken. He spoke also of the foundation of a large steam hammer that had been jarred to pieces, but was ultimately made sufficient by being increased in depth and topped with 12 in. of cork.

## Improved Methods in Finishing Stay Bolts and Straight and Taper Bolts for Locomotives

BY C. K. LASSITER,\* RICHMOND, VA.

The staybolts in a boiler, more than any other part, are subjected to destructive stresses. These bolts were formerly cut to length, drilled for centers and threaded in engine lathes, but as this method was expensive, bolt cutters were substituted. The introduction of the lead screw in bolt cutters brought about a considerable improvement in pitch. The idea of concaving the bolts or reducing them in the center below the root of the thread was conceived with the idea of providing flexibility, and for many years the diameter of the bolt was reduced in an engine lathe after it was threaded in the bolt cutter. About 10 years ago an automatic machine was designed for making side stays from the bar automatically, including threading and concaving. In the drilling of staybolts, considerable trouble has been experienced with drills breaking and an automatic machine for drilling the holes before the stay is placed in the boiler has been devised, which has reduced the cost of this very considerably. The usual method of finishing straight and tapered bolts required a number of operations, but this has been changed by the use of a special vertical multiple spindle drill and a special cutter head. The latter is the essential means of producing these bolts cylindrically true to the axis, the machine being simply the means for driving and feeding the bolt. In connection with this special cutter a device has been perfected for performing the threading operation at the same time that the turning is done.

E. D. Meier, discussing this paper, emphasized that in boiler parts too good a material cannot be used.

Wednesday afternoon was left unassigned to give opportunity for sightseeing. Roller chairs on the boardwalk were available for the visitors and the golf links at Pleasantville were open to their use. In the evening tickets of admission to the entertainments on the piers were provided.

## SECOND SESSION

### Gas Power Section

The first paper presented Thursday morning in the session which was devoted to the subject of gas power presented what is probably a new cycle for gas engine operation, and is abstracted in the following:

### A Regenerator Cycle for Gas Engines Using Subadiabatic Expansion

BY PROF. A. J. FRITH,† CHICAGO.

A new cycle, of theoretically 100 per cent. efficiency, caused by the expansion line being steeper than that caused by free expansion, is presented in this paper, which shows that in the older regenerative cycles the loss of heat to water cooling overbalances the theoretical economy, which is here avoided. How the brake efficiency, under practical conditions, may be derived from formulas and a heat expenditure of 7000 B.t.u. may be expected with a compression pressure of only 125 lb. by the gage, and a peak pressure of 275 lb. gage are also described. This means 50 per cent. greater economy in fuel than is usual, say, with illuminating gas. A chart showing the variations of regenerator efficiency with size, indicates that only practical conditions and temperatures are required to carry out the cycle. A design is shown in which no scavenging is required, no mixtures are made and spontaneous ignition appears. While the danger of pre-ignition is avoided, the conditions for perfect combustion are coupled with light pressure and ordinary good workmanship.

In presenting his paper, Professor Frith, in lieu of reading it, explained the cycle and the engine designed to use it. Sanford A. Moss held that the efficiency of 100 per cent. claimed for the theoretical Frith cycle would be impossible because subadiabatic expansion the full length of the stroke would not occur, but the end of the curve would be adiabatic. Professor Magruder believed that practically an adiabatic curve is not possible, the temperature at the end of the stroke being higher and the heat not put in instantly.

C. W. Baker told of earlier experiments with regenerators. He remarked the large size of these regenerators and the author's small one. The author then closed the discussion, stating that in experiments he has obtained temperatures even lower than those of the theoretical cards. The next paper was presented in abstract by the author, and there was no discussion. Following is an abstract:

\* American Locomotive Company.

† Armour Institute of Technology.

## Gas Engines for Driving Alternating Current Generators

BY H. G. REIST,\* SCHENECTADY, N. Y.

The problem of driving an alternating current generator by a gas engine is not radically different from driving it by a steam engine, although the variations in angular velocity and speed are greater in the former than the latter and that is what affects the driving of alternators. Where a single generator supplies either lighting or heating current, these variations are not important, but with a synchronous motor or rotary converter, cross currents will be set up if the phase relations vary. Mounting the generators on the shaft so that the relations of the poles to cranks were identical and the corresponding cranks synchronized, would produce no cross currents. The variation from a mean position of the revolving parts of the electric generator has been limited by good practice to  $1\frac{1}{4}$  electrical degrees, so that with a many pole machine a more even speed is needed than for one with a few poles. The desirable characteristics of gas engines for driving alternators are high speed, a light flywheel and cranks so placed as to contribute to an even turning moment.

The third paper was also presented in abstract by the author.

## Two Proposed Units of Power

BY PROF. WM. T. MAGRUDER,† COLUMBUS, OHIO.

The term "boiler horsepower" has been variously defined at different times and the value of an "evaporation unit" has increased with each change in the steam tables, so that what is intended as a standard is not only indefinite but confusing. As the object of a boiler is to absorb heat energy obtained from the potential energy of the fuel by combustion and to transfer this energy to a volatile liquid for convenient use in a heat engine or for other thermal purposes, the use of the term "boiler horsepower" is a misnomer, especially as the energy for every boiler is measured in heat units before being reduced to boiler horsepower. To measure the power of a boiler plant in millions of thermal units would not be practical, so the author suggests the adoption of a unit known as a "boiler power," which by definition is equal to 33,000 B.t.u. delivered per hour by a boiler or heating main or added per hour to the feed water of a boiler or to the water of a hot water heating system. The adoption of this term should simplify the whole subject, as the unit will remain constant. The rapid introduction of gas engines using blast furnace, coke oven or producer gas has led the author to suggest the adoption of a unit to measure the heat energy of gaseous and liquid fuels. This new unit is to be 10,000 B.t.u. of heat energy delivered per hour by the fuel under standard conditions of temperature and pressure and is called a "gas power." That number of heat units was chosen, as it represents the average required to develop a horsepower of mechanical energy in the best gas engine practice to-day.

Written discussion on this paper was submitted by Prof. William Kent, who was chairman of the Boiler Test Committee of 1884. The unit now proposed was one of those rejected at that time, 33,000 heat units per hour. The standard then adopted is equivalent to 33,305 thermal units per hour, and is so near to the one proposed by the author of the paper and has been the accepted standard so long that it should not be changed now without strong reasons. He declared, however, that there is good reason for changing the figures used in expressing boiler performance on a heat unit basis, and the factors of evaporation used for converting the evaporation under any stated condition into equivalent evaporation from and at 212 degrees F. This is because the old steam tables based on Regnault's experiments are known to be slightly in error and more accurate tables are now available, that is, those of Marks and Davis. By an example he showed the difference arising from the use of the two tables to be only about 0.04 per cent. The discussor prefers Marks and Davis' tables to Peabody's, and will use them as the basis of tables of the properties of steam and of factors of evaporation in the next edition of his *Mechanical Engineers' Pocketbook*.

H. G. Stott supplemented the paper and suggested perpetuating the name of a great engineer by calling the proposed unit a Thurston. He also suggested making the unit a somewhat larger one than the one proposed by the author, or the one at present the standard, calling it 34,120 B.t.u. per hour the unit, making it a multiple of the kilowatt-hour.

\* General Electric Company.  
† Ohio State University.

## Operating Experiences with a Blast Furnace Gas Power Plant

BY H. J. FREYN,\* SOUTH CHICAGO, ILL.

The plant under discussion in the paper consists of four 2000-kw. gas engine generators receiving blast furnace gas cleaned in a preliminary and secondary washing plant. The former consists of two tangential dry dust catchers and two wet scrubbers, or hurdle washers, while in the latter Theisen gas washers are used. The gas is supplied by six blast furnaces, and had in 1909 an average heat value of 98.3 B.t.u. per cubic foot and contained 26.51 per cent. CO, 3.57 per cent. H<sub>2</sub> and 0.196 per cent. CH<sub>4</sub>. The temperature of the gas entering the gas cleaning plant averages 332.5 degrees F., which was reduced during the cleaning process practically to atmospheric temperature at the engines. The average raw gas pressure was 9.29 in. of water, while gas of 4-in. pressure is delivered by a 100,000-cu. ft. gas holder. The average amount of flue dust in the dry cleaned gas was 1.53 grains per cubic foot, which during the washing process was reduced to 0.0058 grains per cubic foot. The wet scrubbers took out 80 per cent. and the secondary cleaning plant 98 per cent. of the amount of dust received. The total efficiency of the gas washing plant was 99.5 per cent. The amount of moisture in the engine gas averaged 5.62 grains, against 3.49 grains in the atmospheric air. The amount of water used for gas cleaning averaged 102 gal. per 1000 cu. ft. of gas cleaned, 83 gal. of which were used in the wet scrubbers and 19 gal. in the Theisen washers. The power consumed in the gas cleaning plant was 3.3 per cent. of the gas engine output. The load factor for the year was 72 per cent. and the average running time was 77 per cent. of the total possible time. The thermal efficiency at shaft of the plant, as determined continuously by Venturi meter, averaged 20.8 per cent. for 1909. The total output was 50,494,100 kw.-hr.

While presenting his paper the author added a few facts concerning the length of time that various parts of the equipment have been in operation and the performance they have been giving, particularly comparing the first four months of this year with the corresponding period last year. The average amount of gas cleaned per minute has nearly doubled, and experience has indicated changes in the arrangement and use of the cleaning apparatus that have resulted in materially increasing the economy. The main result of the fuel economy of the gas blowing engines has been a very marked reduction in coal consumption of the plants directly or indirectly benefited by the installation.

A written discussion of this paper was submitted by A. E. Maccoun. He reviewed a little of the early use of blast furnace gas engines in this country and the features of design adopted. Different systems of governing were next treated. Indicator cards were submitted, taken at different loads to show the results from employing the constant mixture system. The constant compression system of governing was similarly discussed. The difficulties resulting in the use of the latter system, such as misfiring, &c., show it to be extremely unreliable for light or extremely variable loads, which led to the adoption of the constant mixture system, and excellent results have been obtained. Turning then to engine operation, experience with the engines at the Edgar Thompson Works of the Carnegie Steel Company was referred to, and the changes made from the time of the first installation to the present to increase reliability of operation. The action in a gas engine cylinder was next analyzed and the mechanical conditions imposed. Proper water cooling of cylinders, pistons and heads was next considered and the advantages of cast steel construction. Lubrication followed with special reference to the selection of oil. Then ignition systems, mechanical and electrical, make-and-break, and three ignitors preferred. Cards showed the better efficiency with three. Regarding the author's paper, the discussor questioned the invariable desirability of using gas power. Where blast furnaces have steel works connected, or where they can dispose of their excess power, at least 85 per cent. of the power might be generated from gas, but in other locations the higher cost of a gas installation as compared with steam may not be justifiable. He agreed with the author in not trusting to automatic arrangements for regulating the gas supply, for safety's sake. Concern-

\* Illinois Steel Company.



ing gas cleaning, which forms such a large part of the paper, Mr. Maccoun remarked that all plants installed in this country have been very successful, although probably more elaborate than necessary.

Joseph Morgan regarded the paper as particularly interesting because of recounting the results obtained. He reported that the Cambria Steel Company has made a small beginning in gas power. In the dust catcher used, originally the downcomer was led directly into the side. Later it was made tangential and it was found that the catcher then caught 80 tons of dust instead of 20 tons a day.

William E. Snyder stated that his experience had been such as to make him appreciate the paper. He had not had time to prepare a formal discussion. The paper means an enormous amount of work and is a credit to the society's proceedings, he declared.

H. G. Stott compared the reciprocating engine, low pressure turbine combination which he concluded had a thermal efficiency which is equivalent to that obtained in the gas engine installations described in the paper. He thought it would be interesting to know what might be done by burning the blast furnace gas under boilers. The furnace efficiency would be much greater with gas as the fuel than with coal. He stated that he would like to see an application worked out for steel works, as steam engines have better adaptability to widely and suddenly varying loads.

E. A. Uehling was very appreciative of the paper. He thought that where 600 hp. has been achieved as the power available that 800 is possible. The great problem he holds to be that of gas cleaning, and is convinced that it will pay to clean gas for the stoves use as well as for engines. He illustrated on the blackboard a form of dust catcher that he claims is more efficient than the centrifugal type. In his opinion no lining is needed in gas flues. The temperatures of the gases can be reduced by spraying them if necessary.

E. A. Barnes spoke further of the cleaning problem and the greater need of it for gas engines than for stoves. Ten times as much dust is allowable in stoves as in engines. Centrifugal dust catchers, wet scrubbers and secondary rotary scrubbers were used in series in the practice of his company. The gas is brought to the wet scrubber as hot as possible, because it gives a better separation of the dust. Interesting details of a type of scrubber used and particularly the arrangement for spraying water in the wet scrubber were described.

Captain Tarr of R. D. Wood & Co., Philadelphia, Pa., was called upon for discussion. He stated that he had recently returned from Germany where he acquired the American rights of the Theisen washer. He remarked the difference abroad in dry methods and believes that washers will be used to dry air as well as to clean gas, such air to be used for example in hospitals, hotels, &c.

The next speaker, Edward Rathbun, asked what effect additional cleaning facilities have upon engine cylinder wear. What proportion of this wear is due to sulphur content and what to dust content.

In his closure the author repeated that they did obtain about 25 hp. per ton of pig iron produced, which Mr. Maccoun had considered to be impossible. This result is being obtained at the Lackawanna Steel Company and at Gary. It is easily possible wherever there are several blast furnaces, so that a steady supply of gas can be depended on. He agreed that there is too much apparatus for cleaning. The figure he gave of efficiency—20.8 per cent.—was low, he explained. At first they got 23, and in Germany they are getting 27, 28, &c. He thinks that with improvements that will be made in gas engines here, 25, 26 and 27 per cent. thermal efficiencies will be obtained. He paid a tribute to Mr. Snyder's report on his three or four months' examination of European practice, concerning which that gentleman had made reference in his discussion. He regarded the steam combination mentioned by Mr.

Stott as too expensive, and having too many opportunities for loss of efficiency. He referred to Mr. Uehling's paper before the society on pioneer work on blast furnace gas power and his setting forth once and for all the proper method to calculate the power it is possible to obtain from blast furnaces. He believes that gas cannot be cleaned properly without cooling and unlined flues are all right. Materials of the cylinders are the consideration in the question of wear, not the content of the gas.

### THIRD SESSION

The session that convened Thursday afternoon considered a group of papers of more general character. An abstract of the first of these follows:

#### The Mechanical Engineer and the Textile Industry

BY H. L. GANTT, NEW YORK.

The textile industry has been brought to a high state of perfection without the aid of the mechanical engineer, and its machinery was developed by the mechanic before the mechanical engineer became a very important factor in the industrial world. The most important field of this industry that the engineer has entered is the power department. In this industry a wider gap exists between the financial interest which controls, and the help that operate, than there is in almost any other industry. The textile schools at the present time are doing much to fill this gap by supplying men who can act as a link between the two interests. The lack of such men in the past is undoubtedly responsible for some processes, such as handling cloth in a bleachery, which could be easily standardized and done automatically, being still performed expensively and inefficiently by hand. One of the specific things which the author has in mind is the forming of the pile where the cloth is "soured." The piles are formed by hand, and for subsequent processes portions of two piles may be joined to form one. The pieces of cloth thus become mixed and must be untangled.

To do this work more efficiently and less expensively the author has developed a machine consisting of an inclined chute with upturned ends and a bottom composed of a series of freely revolving independent rollers. The cloth is fed into the stack and is carried by its own weight to the bottom. As the fabric rises in the receiving stack, the forward end of the pile is forced upward into the other end of the machine and is taken off at the rate at which it enters the receiving stack. These machines produce a marked saving in time and also a saving in the amount of floor space required.

The author gave the substance of the paper in brief and there was no discussion. The next paper was

#### The Elastic Limit of Manganese and Other Bronzes

BY J. A. CAPP,\* SCHENECTADY, N. Y.

The object of this paper is to show that while the so-called elastic limit or yield point of steel is so well marked that it may be depended upon, there is no equally well defined point found in the testing of bronzes. Manganese bronze was selected as the metal to be tested, because it was one of the strongest of the modern alloys and was readily obtainable. It was used as a type and the results obtained regarding its behavior under tensile tests are, in the author's opinion, typical of bronzes and bronzes in general. For this test, cylindrical castings 1½ in. in diameter and 24 in. long were procured from a number of leading manufacturers. In addition to these specimens, two bars of the same dimensions hot-rolled to size and two hot-rolled and cold-drawn were procured. From these bars test sections 1 in. in diameter and 8 in. long were turned, with the ends threaded.

Extensometer and commercial tests were made on these test pieces and from the balance of the bars, the customary ½ in. x 2 in. test pieces were turned and subjected to the regular commercial test. The values obtained from the bronze tested varied so widely as to indicate that no dependence can be placed on the so-called yield point. Neither hot nor cold working caused any change in the elastic curve.

F. W. Dean wanted to know if steel left alone recovers its original properties. The author told of a test made by Howard on some pieces laid away after being strained beyond the elastic limit, which were found to almost entirely recover, and the point of permanent set was found to be higher than originally.

E. A. Uehling answered a point raised by President Westinghouse, by explaining an experience which he had in tests made on cold-rolled steel in 1887. He found that a piece strained above its elastic limit will take a new elastic limit on a second test at a point where the last left off and so on in repeated tests.

\* General Electric Company.

### The Hydrostatic Chord

BY RAYMOND D. JOHNSON,\* NIAGARA FALLS, N. Y.

This paper contains a discussion of its application in the design of large reinforced concrete pipes. The hydrostatic chord is allied to the catenary, the parabola and the circle because all of these curves may be found by a flexible inextensible surface supported at its two extremities and properly loaded, that for this curve being caused by fluid pressure due to the head of water at any point. The hydrostatic chord is the shape assumed by a closed canvas cylinder filled with water and laid on its side with a vertical pipe connected to its upper side. A circle is not the natural shape for a pressure pipe lying on its side, especially if its diameter is large as compared with the water pressure. A circular cylindrical shell lying on its side has four points of contra flexure due to its own weight, and the locations of these points due to the weight of the water are the same. The equilibrium shape which would sustain the existing water pressure without any tendency to deform can be easily plotted from the polar equation of the bending moments in a circle in terms of the angle of departure from the vertical.

This paper was presented in the absence of the author by L. G. French. There was no discussion.

### The Resistance of Freight Trains

BY PROF. EDW. C. SCHMIDT, URBANA, ILL.

Train resistance varies not only with the speed but also with the average weight of the cars, and at a given speed the tractive effort per ton will be greater for trains composed of cars of 20 tons average gross weight than for a train whose cars weigh on the average 50 tons. This fact has been known for some time, but has not been considered in the establishment of tonnage ratings by many of the railroads, and for that reason a series of tests extending over a year were made by the University of Illinois to determine the resistance of freight trains under ordinary operating conditions and also the relation existing at any given speed between train resistance and average car weight. These tests were made by coupling a dynamometer car to 32 trains having from 26 to 80 cars each and an average car weight ranging from 16.12 to 69.92 tons. These trains were of the types met with in regular freight service and under ordinary conditions. The following information was obtained during each test: Drawbar pull, speed, elapsed time, air brake pressure, direction and velocity of wind with relation to the car, location of car on the road, meteorological conditions and weight of train. With the exception of the last two items all were obtained in the form of continuous graphical records upon a chart produced by the apparatus of the dynamometer car. The results of each test were plotted in the form of a train resistance-speed curve, care being taken to secure as great a speed range as possible with evenly distributed points between the two extremes where the train was running upon straight track.

The results obtained tended to show that the resistance increased with the speed and decreased as the average car weight increased, and was not affected by the velocity of the wind to any appreciable extent where the trains were run at uniform speed upon level and tangent track during weather when the temperature was above 30 degrees F. and the wind velocity did not exceed 20 miles per hour.

This paper was presented in the absence of the author by Secretary Rice, who also read a written discussion from F. S. Bailey. The discussion noted that the lowest temperature recorded during any test was 34 degrees and the highest 82 degrees, and that the temperatures at the beginning and end of the test were recorded, but not the mean temperature for the whole run, and considered that a correction for temperature is essential, as the variation in density in air between 34 degrees and 82 degrees is about 10 per cent, which affects resistance by an equivalent amount.

Another written discussion had been received from Prof. William G. Raymond, who was particularly pleased that the experiments seemed to have conclusively settled the disputed point of increase of resistance with speed. He never accepted the statement recently made that freight train resistance is essentially constant between speeds of 10 and 35 miles an hour. He thinks that the make-up of trains as well as the weight should be taken into account. He has found that one law fits observations for trains at 45 tons average car weight and upward, another those between 25 and 40 tons average car weight, and was unable to determine whether the curve for the lightest car weights of 15 tons belongs with those in the heavier

or the medium weight group. A reason seems to be that all very heavy trains are made up largely or almost wholly of loaded gondola cars and the lightest of empty gondolas, while between 25 and 40 tons average car weight trains were wholly or largely box cars. The latter with their greater surfaces may give resistances following a different law from that applying to trains of gondolas. He therefore concludes that two or three general expressions might be well—one for box cars, one for gondolas and one possibly for a combination of both, although the latter may be an unnecessary refinement. He offered a single equation that agrees quite closely with the results obtained by the author.

H. G. Stott thought that caution should be taken in drawing any conclusions from such results as those in the paper because they were not all made under the same conditions. If the same train had been studied throughout it would be different; mixed trains would introduce complications. In the Interborough Rapid Transit Company's operations it has been found that on cold mornings loads go up enormously, due to the condition of the lubricants and other things until the trains get warmed up.

G. N. Van Derhoff brought up the subject of the energy of vertical vibrations, remarking that this is not a closed cycle, so the energy is not balanced. How much of the total energy required to pull trains is used up in vertical vibration is not known, and can hardly be determined by any known method. Spring of the rails as well as spring of the cars might account for considerable of the train resistance.

William H. Bryan referred to discussion of this paper at the St. Louis local meeting where it was first presented. After the presentation at that city the author brought the dynamometer car to St. Louis, and engineers there had opportunity to examine it. The paper points out clearly disadvantages of small cars. Known high costs of railroad operation in Europe are doubtless attributable to the number of small cars used. Apparently there is no advantage in having cars heavier than 75 tons weight. Regarding the point of warm and cold trains he explained that this had also been brought up at St. Louis, and it was agreed that cold trains took much more power until they were warmed up. There are now about 12 of these dynamometer cars in use and up-to-date railroads have them. Further tests on the effect of grades and curves are to be investigated and reported on later. Above about 30 to 34 degrees temperature there does not appear to be any difference in results obtained, but below those temperatures there is. One of the discussors had remarked that it would have been of advantage if the tests had been made under the same conditions and with the same combinations at all times. It was explained that the author had purposely tested various combinations, taking trains just as they were found, to get average results.

A written discussion of the paper was submitted by F. J. Cole. He declared the paper a valuable addition to the literature on train resistance and approved the conditions of the test, and cited as the most important conclusions those relating to the difference in resistance per ton obtained with cars of various weights and capacities. He mentioned his contribution published in the *Railroad Age Gazette* August 27 to October 8, 1909, summarizing available tests and literature on the general subject and his own conclusions. Some of these were: The resistance of freight cars varies greatly with their capacity and weight, and whether empty or loaded; the decrease in resistance on level straight track on 50-ton capacity cars (total about 72 tons) is of great significance in estimating tonnage ratings on low grade roads. This decrease in resistance becomes of gradually less importance with increase of grade. The resistance of American freight cars is practically the same between the limits of 5 to 10 and 30 to 35 miles per hour. The journal friction

\* Ontario Power Company.



is greatest at starting, then rapidly decreasing, and gradually reaching its minimum somewhere around 20 to 30 miles per hour, afterward slightly increasing or remaining constant. A journal friction with good lubricant within the limits of railroad pressures probably varies inversely as the square root of the pressure. With large capacity loaded cars at freight car speed on good track, journal friction forms a large percentage of the total resistance. The condition of the track, stiffness of the rails, &c., are important factors in train resistance, because much energy is expended on poor track in dampened oscillations, which cause an absorption of energy and concussions which cause principally an increase in flange friction.

Written discussion was also received from Prof. W. F. M. Goss. He commended the paper and pronounced the author one of unusual experience in the field with which it deals. Professor Schmidt since 1894 has had charge of all work in train resistance engaged in by the University of Illinois and the Illinois Central Railroad and designed the dynamometer car used. The same car was used by him for B. J. Arnold in securing data for the steam railroad electrification work of the New York Central. Professor Goss also mentioned F. J. Cole's review of train resistance investigations, published last fall, and regards Professor Schmidt's paper an addition to this summary and of undoubted reliability.

A written discussion was also read from John B. Blood, who regarded the results valuable, but not worked up in the light of present knowledge on the subject. The author had stated that the variation of train weight in resistance values has not found adequate expression in formulas and the discussor called attention to his own paper presented before the Society on "A Rational Train Resistance Formula," in which he gave values of a coefficient caring for varying car weight, and explained briefly his own formula and its use. The results obtained with his formula in comparison with Professor Schmidt's results are tabulated and the differences are less than errors of observation.

#### RECEPTION

Preceding the president's reception to the visiting members Thursday evening, honorary membership was conferred upon Rear Admiral George W. Melville, U. S. N., retired. President Westinghouse made a speech of congratulation, and the admiral replied with a few words of appreciation. Admiral William White of the British Navy, who was present, also made a congratulatory address appreciative of Admiral Melville and his life's work, and the main address of the evening by Rear Admiral Melville on "The Engineer's Duty as a Citizen" was read for him by one of his former assistants in the Navy Bureau of Engineering, Walter M. McFarland. The usual dance followed the president's reception.

#### FOURTH SESSION

The concluding professional session convened Friday morning to consider a group of papers on power transmission. The author presented the first of these, an abstract of which follows:

##### Improvements in Line Shaft Hangers and Bearings

BY HENRY HESS,\* PHILADELPHIA, PA.

This paper is a continuation of the paper on "Lineshaft Efficiency, Mechanical and Economic," by the same author, presented at the meeting held in New York, December, 1909, and has for its object the description of a special hanger and the results obtained from tests made on it. The Sellers type of hanger, while well adapted for use with plain bearings, was not found practicable with ball bearings, because the spherical sections outside the box for it to rock on were too flat for the large diameter of the box containing the ball bearing. After laying out a number of forms of hanger on paper, a design was finally evolved, in which the box is supported and pivoted horizontally. The body proper is of channel section and is attached by a single bolt at each end. The bearing box is a central cast supporting ring bored to fit

the outer race of the ball bearing and provided with cover plates at the sides. This arrangement retains the lubricant and also excludes foreign matter. The ball bearings are free to move endwise in the box, but are clamped fast to the shaft so that the inner race cannot rotate. Special alloy steel is employed for the construction of the balls and the races.

Frank B. Gilbreth was curious to know if concrete buildings and mill type buildings have any effect on line shafting; whether it is easier to maintain alignment in a concrete building or not. He also asked for information regarding the best ways of mounting shafting hangers in concrete buildings in a way that would permit their change of location. H. J. Smith wanted to know if heat was not given to the bearings of shafting out of line by the continued bending of the shaft.

F. W. Dean thought that it must be necessary to have the shafting aligned more frequently in mill buildings than in concrete buildings, as the latter are permanent once they have set. However, entire freedom from line shafts getting out of alignment is not to be expected, because they are simply held by friction. There is always play in the bolt holes holding the hanger, and shrinkage of timbers or vibration may allow some movement in any building.

C. J. Jackson reported that he had been operating a ball bearing in a polishing room without serious cutting from the dust, probably because the ball bearing is lubricated with soft grease instead of oil.

The various points brought up in the discussion were handled by the author in his summing up. Concerning the effect due to dust in concrete buildings he explained that dust will destroy ball bearings if it gets in, but it is easy to keep it out. Ball bearings are being run on dredges where they are 40 ft. under water, and the water is kept out and the lubricant in by the form of bearing used. The Thompson Meter Company has a concrete building in which no trouble is reported from dust. In a marble works ball bearings are running without any trouble and in textile mills they are able to operate without any trouble from lint. The heating of ball bearings is due to mechanical work imposed by misalignment. Its effect is not very evident in ball bearings, while it is plainly observed in ordinary bearings. There is but a very small rise of temperature in a ball bearing even with an exceedingly heavy overload. The question had been asked as to how frequently it was necessary to align a shaft with ball bearing hangers, and it was answered the more rigid the building the less frequent the necessary alignment. Ball bearings will reduce friction 60 to 90 per cent. over ordinary bearings. Lubrication and drip are partly taken care of by inclosing the bearing. The space for lubricant is so large and the amount required so small in ball bearings that they will run from three to five years without replenishing of oil. It is not a question of the lasting of the lubricant, but its gumming, and, all things considered, it is advisable to look after such a bearing at least once a year. Regarding the best method of supporting bearings in concrete buildings, the author referred to practice in a German plant, where they have placed cast iron channels in the ceiling with T-slots and about 3 ft. apart, running lengthwise of the building. Across these other channels can be clamped, permitting the locating of hangers anywhere.

##### Experimental Analysis of a Friction Clutch Coupling

BY PROF. WM. T. MAGRUDER, COLUMBUS, OHIO.

The paper deals with a series of experiments made to determine the results from the application of a known force at the end of the shifter lever of a 24-in. friction clutch coupling. Five lines of investigation were pursued in making these tests and two special machines for measuring the dynamic and static forces were constructed. The first series of tests was made to determine the forces required to throw in the shifter lever at different speeds, when the clutch was in motion and when it was at rest and before and after the load had caused it to slip; the second had for its object the determination of the relations existing between the forces applied at the end of the shifter lever and those exerted by the clutch shoes upon the ring of the clutch pulley with dif-

\* President Hess-Bright Mfg. Company.

ferent adjustments of wedges; the third was to obtain data on the frictional resistance between the clutch shoes and the ring of the clutch coupling in motion and at rest; the next was made to determine the power transmitted for different adjustments of wedges and the maximum amounts it could transmit and pick up from rest; and the last group had for its object determining the relations between the forces applied at the end of the shifter lever and the maximum power transmitted by two-arm and four-arm clutches. The results of these tests showed that a clutch of the type tested running at 100 rev. per min. and properly adjusted would probably break in transmitting 200 hp. if gradually applied or picking up loads in excess of 110 hp.; that to do this a maximum force of between 100 and 115 lb. must be applied at the shifter lever with a leverage of five; inequality in the bearing pressures of opposite shoes on the ring or lost motion decrease the breaking strength; that a split clutch will break before one of the solid pattern, and that a factor of safety of 10 is ample.

A discussion of this paper illustrated with lantern slides was presented by H. J. Smith. He declared that the third of the kinds of tests made by the author—i. e., the clutch in motion with the load suddenly applied to determine the pick-up load capacity of the clutch—is the one which really determines the capacity of the clutch and its factor of safety. During the time of slippage under pick-up loads the coefficient of friction is lowest and the wear on the wood shoes greatest. The discussor claimed that the rating of a clutch of any size should be based on its split type; a 24-in. split clutch broke under test at about 90 hp. at 100 rev. per min. The rating of the maker is 19 hp. at that speed; the factor of safety, therefore, is less than five. The discussor further described and recounted tests on the improved Hill rim type clutch of the Smith design, which is very heavy, with extra large friction surfaces, substantial guides and powerful toggle action. A No. 60 24-in. is rated at 60 hp. at 100 rev. per min. It is positive in disengagement and has no springs.

Oberlin Smith maintained that large diameter clutches are desirable to increase the friction surfaces and decrease the clamping power necessary. It is the practice at the Ferracute Machine Company, of which he is president, to run clutches at the highest possible speed to avoid having to use too heavy pressures. They use cone clutches in preference to other types as being simpler, making friction surfaces as large as possible and speeds high.

#### An Improved Absorption Dynamometer

BY PROF. C. M. GARLAND,\* URBANA, ILL.

The dearth of efficient power absorbing apparatus often handicaps the engineers in testing prime movers, especially in the case of small high speed machines, such as automobile engines and steam turbines. A consideration of various features of design, construction and operation practically eliminates mechanical friction apparatus and machines depending on the friction or resistance of liquids for their operation, thus leaving only the principle of magnetic induction to be employed. The current produced by the utilization of this principle can be either collected and led away from the machine or allowed to remain and produce heat by short circuiting. The dynamometer described in this paper employed the latter means and consisted of a metallic disk revolving between a set of pole pieces. In operation the engine is connected to the dynamometer by a flexible coupling and started. After normal speed is reached the load is thrown on by energizing the field coils and the torque regulated by a rheostat connected in series with the coil. Under normal conditions the load is constant, and the variation in the torque, indicated by a spring balance, can be measured with greater accuracy than is required in the most refined testing work. The torque is proportional to the speed and depends upon the speed, number of poles, thickness of air gap, thickness of the copper disk, and the shape and spacing of the pole pieces.

A written discussion of this paper received from Prof. C. M. Allen of the Worcester Polytechnic Institute remarked that practically all of the claims brought out in the paper are applicable to and descriptive of the Alden absorption dynamometer.

At this point Ambrose Swasey, chairman of the committee in charge of the arrangements for the trip to England next month to attend the meeting of the Institution of Mechanical Engineers in Birmingham,

was called upon to make a few announcements with regard to this trip. He briefly outlined the pleasures which await those who will attend and urged that all who had not planned to do so endeavor to attend.

#### Critical Speed Calculation

BY S. H. WEAVER,\* SCHENECTADY, N. Y.

Critical speed is that at which the maximum vibrations of the revolving mass or supporting structure occur. These vibrations are smaller for speeds both above and below the critical value, and it is important for a designer of high rotational speed apparatus, such as turbo-generators and frequency changers, to predetermine these points of maximum vibration. This phenomenon has been known for some time, but there is no literature on the subject outside of a number of mathematical demonstrations, and it is the author's purpose to give a mathematical treatment of the subject by considering the motion of the shaft as vibratory along two axes, study the vibrations for all speeds, reduce the formulas to practical form and tabulate them for convenient use. All the critical speed calculations assume an unbalanced load, as it is practically impossible to balance a rotating mass so that its center of gravity exactly coincides with the mechanical axis of rotation. This produces a deflection in the rotating shaft due to centrifugal force until the force of shaft deflection is equal and opposite to the centrifugal force of the mass. Where the normal running speed is higher than the critical speed, the shaft is made strong enough to withstand deflection in passing through the critical speed and as flexible as possible for smooth running above it. A number of formulas have been derived by the author for the critical speed value for both concentrated and distributed loads for horizontal and vertical shafts. The obliquity of the load due to the bending of the shaft has not been considered, as it does not introduce any considerable error if the load is approximately half way between the bearings. Theoretically the vibrations become infinite at the critical speed, but they really have their maximum at that point.

A written discussion of this paper from Henry Hess stated that he had found the contribution very important, the development of the formulas interesting and the shape in which they were presented especially valuable to the busy engineer. He remarked that all were based on assumed definite single points as centers of support, whereas journals have length that should be taken into account. The exact part of the bearing where the center of pressure exists, he declared, is indeterminate. The shape of originally parallel close fitting bearings will change, becoming bell mouthed at one or both ends, and then constantly changing in varying amounts. It follows that the point of load concentration is also constantly shifting. He holds that a formula based on the assumption of a fixed point of support must fail of giving satisfactory results. Ball bearings, on the other hand, permit, providing definite fixed points of support where a single row of balls carries the load and in which the contact between the balls and races lies in a plane at right angles to the axis of the shaft.

Written discussion was also received from M. Nusim. He recalled a formula mentioned by the author as given in a paper by Professor Morley, which is applicable to a shaft of constant or variable diameter with any number of loads and with any number of bearings. It covers all of the simpler cases given by Mr. Weaver, and there is no preference between them, but this formula also covers complicated cases with three loads, &c., which the simpler formulas do not, and gives the lowest or first critical speed only. Using the formula results were obtained accurate within a small fraction of 1 per cent.

This concluded the consideration of papers at the meeting. Before adjourning Jesse M. Smith read resolutions of thanks to the local committee who had charge of the entertainment, consisting of members residing in Philadelphia and other nearby cities, headed by James M. Dodge as chairman. The resolutions of thanks were passed and, following the announcement of the appointment of the nominating committee for officers to be elected in December, R. W. Hunt, G. M. Basford, H. Hess, W. H. B. Rosing and T. F. Gaines, the meeting adjourned.

\* University of Illinois.

\* General Electric Company.



## The Summers Motor Driven Ore Car

Built for the International Smelting & Refining Company

The Summers Steel Car Company, 2312 Oliver Building, Pittsburgh, Pa., has recently equipped two of its self-clearing ore cars which were described in *The*

doors. These are of heavy pressed steel and open downward so that the angle between the sides and ends of the cars is about 50 degrees. The door opening is so wide as to overcome the bridging effect of the ore as the portion of the load over the doors immediately falls out when they are lowered and is followed by that portion over the side and end floors. Each door is supported at its outer edge by heavy hinges and at both ends by chains. These chains are attached to and wind



Fig. 1.—Side View of a Motor Driven Ore Car, Built Under the Summers Patents by the Standard Steel Car Company, Pittsburgh, Pa.

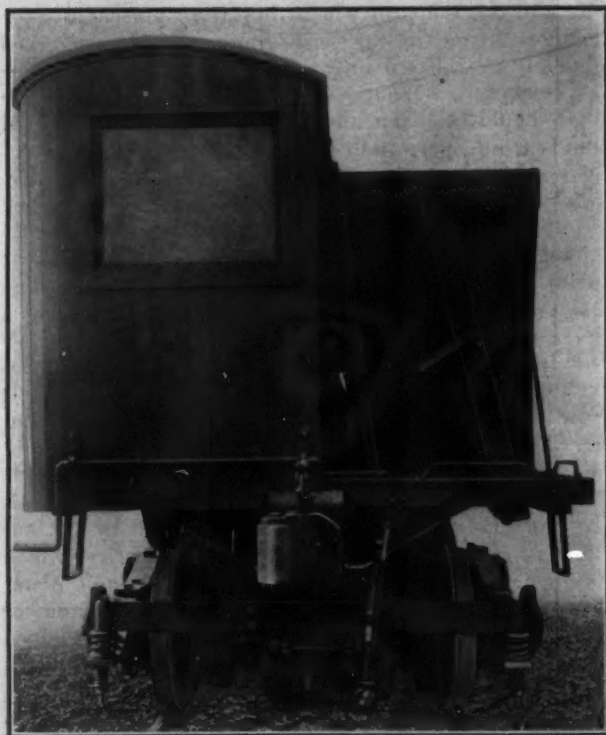


Fig. 2.—End View, Showing Crank for Operating Doors and Location of Motor.

*Iron Age* January 28, 1909, with motor trucks and complete electrical equipment for their propulsion and control. These cars were furnished to the International Smelting & Refining Company and were designed for hauling copper ore from a cableway terminal to storage bins over a  $1\frac{1}{4}$  per cent. grade at an estimated maximum speed of  $8\frac{1}{2}$  miles per hour.

Fig. 1 shows a general view of the car and Fig. 2 is an end view. The haul is a comparatively short one and the car dumps often. For that reason particular attention has been paid to the easy operation of the

around a steel drum fastened on a shaft. This shaft is connected through gearing to an endless steel chain which is operated by the door-opening crank conveniently located on the end platform. In this way only one man is needed to run the car and operate the doors at the storage bins.

The electrical equipment of the cars consists of two 35-hp. type K 101 Westinghouse 500-volt series wound railway motors made by the Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa. These motors are mounted one on each truck with a gear ratio of 14 to 79. A series-parallel controller with the necessary resistance grids and circuit breaker are all conveniently located in the cab and the current will be collected from a trolley wire located about 22 ft. above the tracks, the rails being used for the return portion of the circuit. A powerful handbrake, operating shoes on all the wheels of the car, is provided.

The following table gives the principal dimensions and specifications of the car:

Capacity, cubic yards.....	80
Length face to face of coupler knuckles, feet.....	24
Length center to center of trucks, feet.....	15
Inside length of car body, feet and inches.....	17 5
Wheel base of truck, feet.....	5
Distance from top of rail to top of car, feet and inches... 9 5	
Outside width of car body, feet and inches.....	8 7
Inside width of car body, feet and inches.....	8 6

These cars can dump their load in somewhat less than a minute, and it is reported that even during the coldest weather cars of this type in the service of the ore carrying roads of the Northwest after a 70-mile run from the mines to the docks dump their loads without the usual delays incident to frozen ore.

Bids are being asked by the Pittsburgh Plate Glass Company for the rebuilding of its plant recently destroyed by fire at Ford City, Pa. The new plant will be of steel and concrete construction, and will be equipped with lockers and dressing rooms for the employees. It is stated that about \$200,000 will be spent in the new building and in equipment.

Mechanical and Civil Engineers,  
PITTSBURGH, PA.

# The Microscope and Some of Its Applications to Metallurgy\*

BY WIRT TASSIN.

The talk this evening is along lines which for the most part are familiar to an audience acquainted with the various developments in the several branches of metallurgy. A part of my talk may, however, not be familiar to some of you, and to develop that part it will be necessary to take up certain preliminary details concerning the structure of metals.

## The Structure of Metals

All metals are made up of aggregates of crystalline grains—and this holds true for an alloy as well as for a virgin metal—regardless of their origin or to what processes they may have been subjected, whether they



Fig. 1.—Ingot Copper Polished in Relief, Showing Segregated Lines of Oxide.

were deposited from solution or smelted, and then cast, rolled, forged or drawn, hot-worked or cold-worked. These aggregates constitute the structure of the metal, and its character is determined to a large extent by the heat and mechanical treatment to which the metal has been subjected; also a certain structure is characteristic of certain physical properties.

Such being the case, it becomes apparent that some means of identifying structures and determining the conditions under which a given structure could be re-



Fig. 2.—Ingot Copper Etched with Ammonium Persulphate and Showing Lines of Segregated Oxide.

produced would result in the manufacture of a metallic product of the greatest efficiency. It is at this point that the usefulness of the microscope and its

industrial value become apparent, since with its aid we can determine the character of the desired structure and exercise a control over the treatment which will yield it.

## Preparing a Polished Surface for the Microscope

To study a metal under the microscope it is first necessary to polish it to a mirror finish. If this be



Fig. 3.—Cross Section of an Ingot of Copper Etched with Ammonium Persulphate.

carefully done, it is possible to develop a structure by this means alone, as is demonstrated by Fig. 1, which shows the segregated lines of oxide in a piece of ingot copper polished in relief. The preparation of a surface polished highly enough to show structure in relief is tedious and time-consuming, and the results obtained are more or less unsatisfactory, so that it is generally more expedient to stop the polishing when a good finish has been obtained and then etch the surface with some solvent. This, if properly carried out, will develop

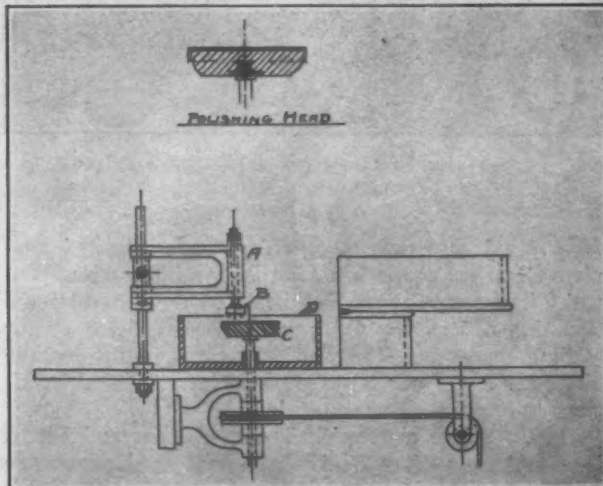


Fig. 4.—Polishing Machine.

\* Read at the April 6 meeting of the Philadelphia Foundry-men's Association.



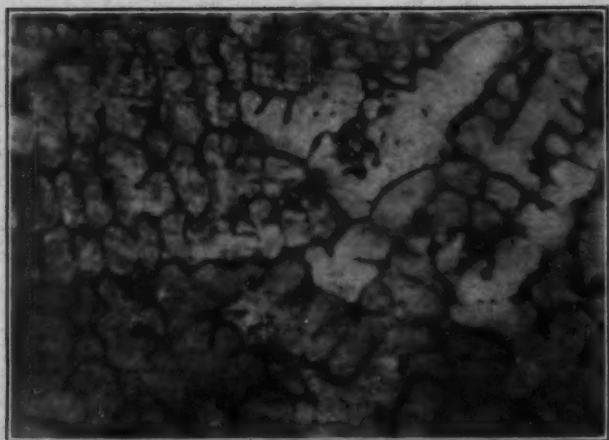


Fig. 5.—Copper Etched with Nitric Acid.

the structure with great distinctness, as is illustrated by Fig. 2, which is a section of copper similar to that just shown, but etched with ammonium persulphate.

The preparation of a polished surface may be accomplished in various ways, but I will limit myself to a description of my own methods. The specimen, which may be of any desired size, and I have prepared sections as large as a cross section of an ingot

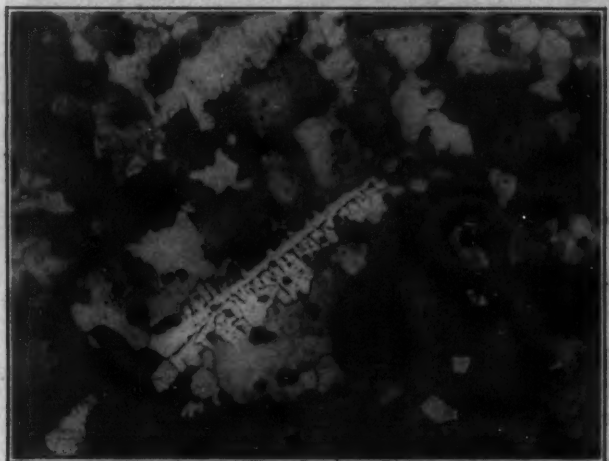


Fig. 6.—Copper Etched with Ammonium Persulphate.

of copper, Fig. 3, is first cross-filed and then draw-filed, and when hand-smoothed is finished on a power polishing machine.

This machine, Fig. 4, is motor driven, and is so geared that the heads travel at about 2000 rev. per min. The construction of the machine is very simple, and, exclusive of the motor, it can be made in any shop, at a trifling cost. It consists of a top about

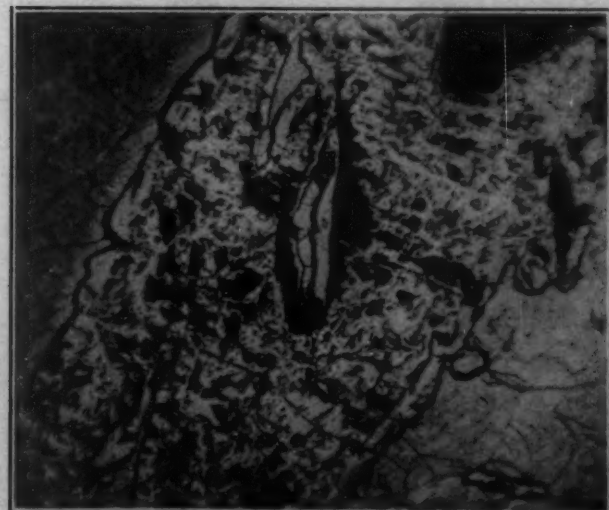


Fig. 7.—Phosphide of Iron Etched with Cupric Ammonium Chloride Followed by Nitric Acid.

1 in. thick, mounted on a sewing machine stand, across the bottom of which is fastened a platform to carry the motor. This top carries the bearing and hanger for the drive and spindle. The heads are made of

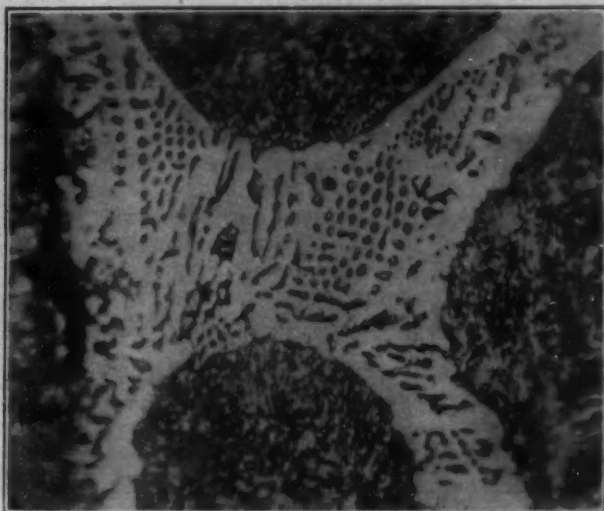


Fig. 8.—Phosphide of Iron After Law.

hard wood and carry on one face a brass plate, which is tapped to receive the thread on the spindle of the drive. Fitting somewhat closely to the rim of the head is an iron ring, which serves to hold firmly in place a piece of cloth which carries the abrasive. For ordinary work but four heads are used, two of which are covered with canvas, one with felt known as "weight 3 1/4," and one with either velvet or broad-

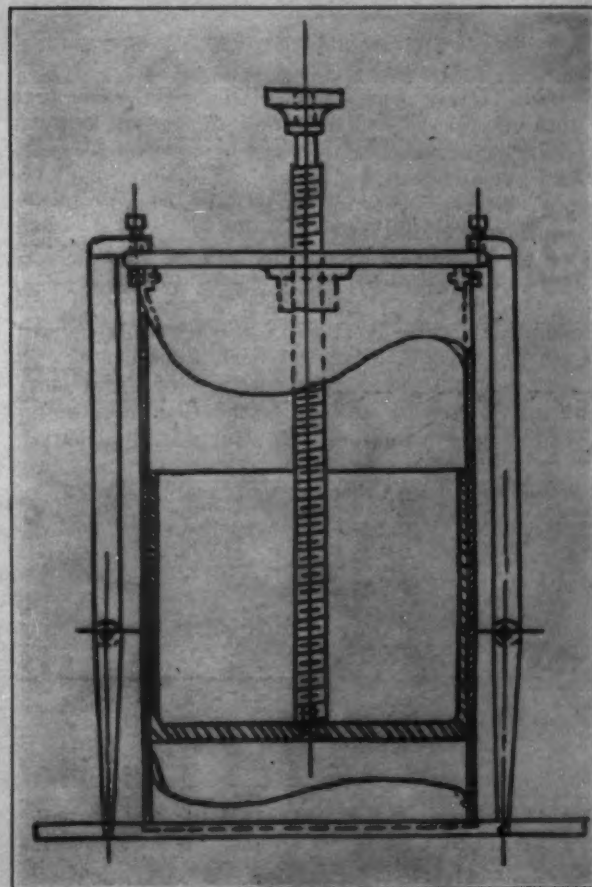


Fig. 9.—Leveling Device.

cloth. One of the canvas covered heads is charged with "flour emery paste"; another with "washed flour emery paste"; the third, or felt wheel, is charged with "Matchless gold and silver rouge F"; the velvet wheel is used to finish with. In polishing, the specimen is given as high a finish as possible on the No. 1 wheel and is then washed thoroughly in water and in

alcohol. It is then put on the No. 2 wheel, and so on, care being taken to wash thoroughly after each grinding. The entire operation sometimes taking as little time as 10 min.

#### Etching and Mounting

After polishing the specimen is ready for etching. This is done by means of some reagent which attacks

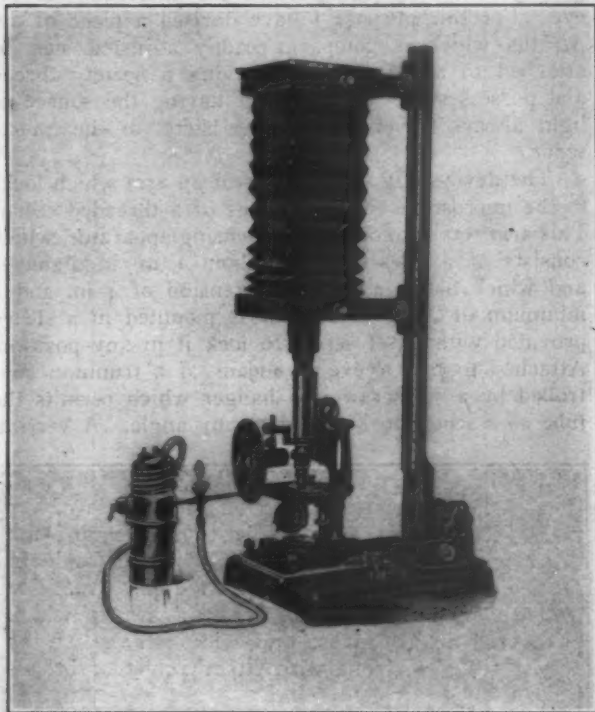


Fig. 10.—Microscope for Metallographic Work.

or colors certain constituents of the metal more than it does others. The character of the etched figure is dependent upon the kind of reagent used and the manner in which it is applied; therefore, it may readily be seen that there is at this point room for the display of considerable skill and ingenuity.

As an illustration of this, let us look at a piece of copper etched with nitric acid, Fig. 5, and compare its

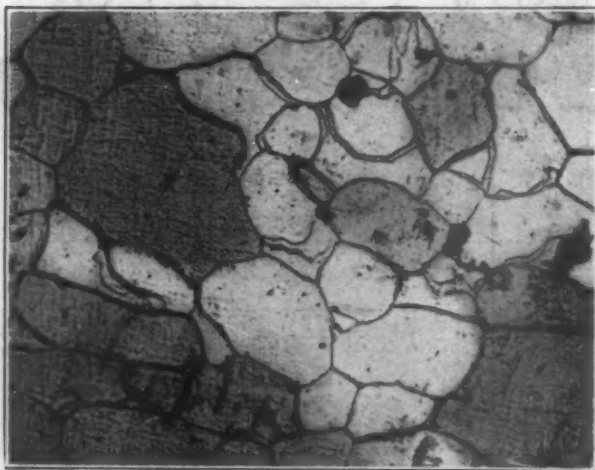


Fig. 11.—Wrought Iron Etched with Nitric Acid, Vertical Illumination.

structure with a similar piece of copper etched with ammonium persulphate, Fig. 6, or, to still further emphasize this point, compare this phosphide of iron, which has been etched with cupric ammonium chloride, followed by a mineral acid, Fig. 7; with this, Fig. 8, which I have copied from Law and where acid only was used.

After a proper etching and drying the specimen is now ready for mounting, and use is here made of the device, Fig. 9. This consists of two pieces of brass

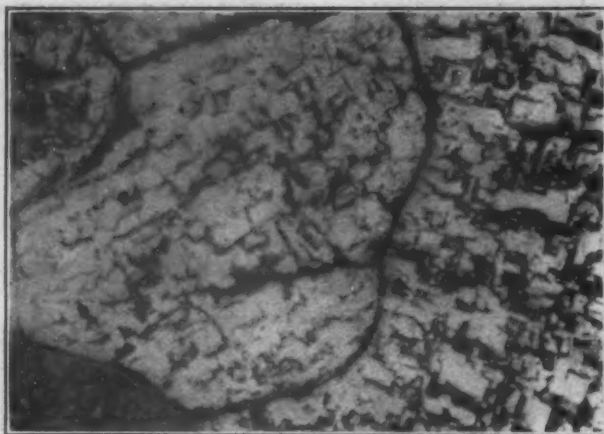


Fig. 12.—Wrought Iron Etched with Nitric Acid, Oblique Illumination.

tubing of any convenient diameter which telescope and are ground to fit. The outer tube carries a brass strip of any desired width across its top and securely fas-

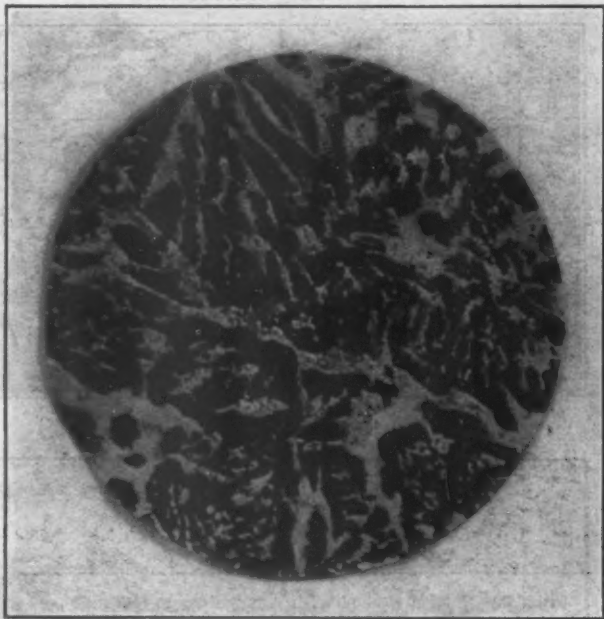


Fig. 13.—Steel as Cast.

tened to it, and which is centrally tapped to receive a screw carrying 20 threads to the inch. This screw has a milled head and is about an inch longer than the

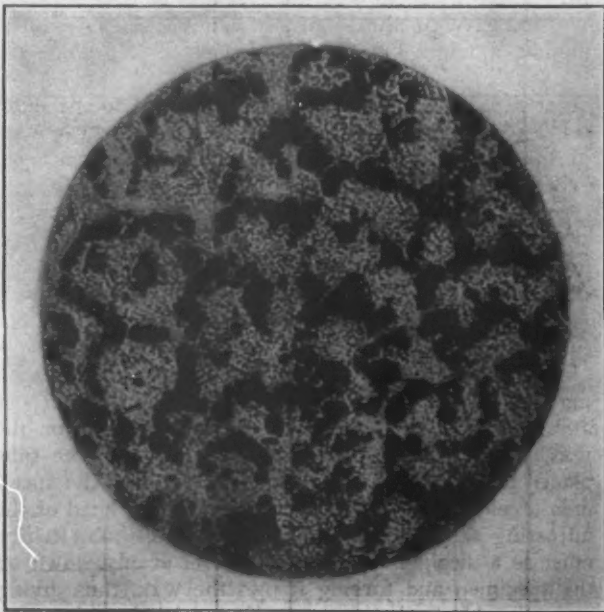


Fig. 14.—Improperly Annealed Steel.



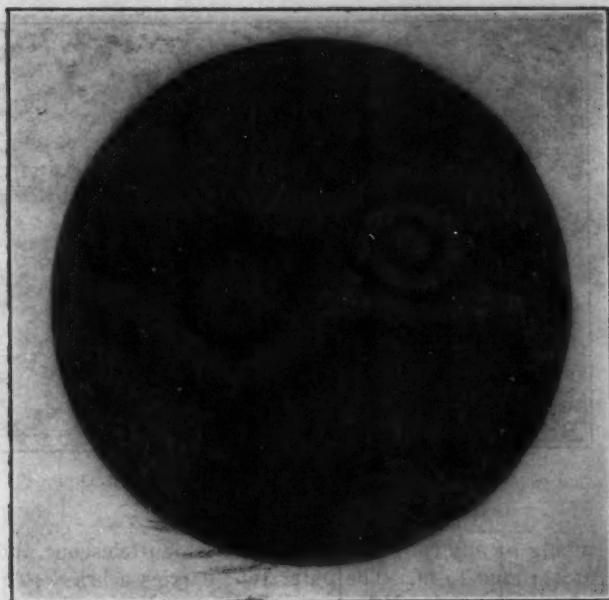


Fig. 15.—Properly Annealed Steel.

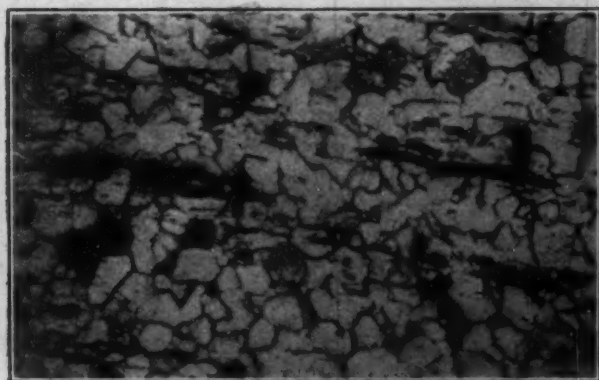


Fig. 16.—Wrought Iron.

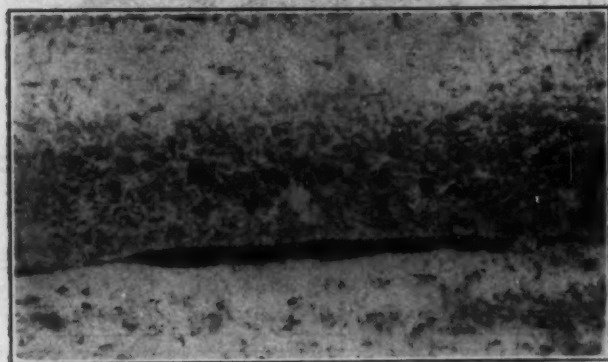


Fig. 17.—Charcoal Iron.

outer tube. This adjusting screw is fixed to the inner tube by means of a screw bottomed in it in such a manner that the inner tube can be readily raised or lowered, but cannot revolve. The inner tube should be of a length sufficient to give a good bearing and not be thrown off of level. The whole is set up on a base plate provided with a groove which receives the outer tube and which also carries two hinged clamps screwed into the plate and provided with set screws to lock the tube when in position.

The method of use is as follows: A lump of modeling wax is stuck on any slide suitable for the purpose and the specimen set up in the proper position on the wax. The slide is placed on the base plate, the tube placed in the groove and clamped down, and the specimen leveled perfectly by turning the milled head of the adjusting screw so as to bring the inner tube, which must as a mechanical necessity travel evenly, down on the specimen and forcing it into the wax, thus giving a serviceable mount and assuring a level surface for examination under the microscope regardless of the

shape of the specimen. The set screws are now released, the clamps thrown back and the specimen is ready for study.

#### Illuminating the Specimen

Since metallic objects are opaque and cannot be examined by transmitted light, it is necessary to make use of some special device to illuminate the specimen and get light through the barrel of the microscope to the eye. For this purpose I have devised a piece of apparatus which is compact, readily adjusted, can be attached to any microscope having a society thread and possesses the advantage of having the source of light always traveling with the barrel of the microscope.

The device, Fig. 10, consists of an arm which locks to the microscope tube by means of a threaded collar. This arm serves to carry a condensing apparatus, which consists of a telescope tube about 1 in. in diameter and which has a maximum extension of 4 in. and a minimum of 2 in. This tube is mounted in a sleeve provided with a set screw to lock it in any position. Attached to this sleeve by means of a trunnion controlled by a set screw is a hanger which permits the tube as a whole to be tilted at any angle. A vertical

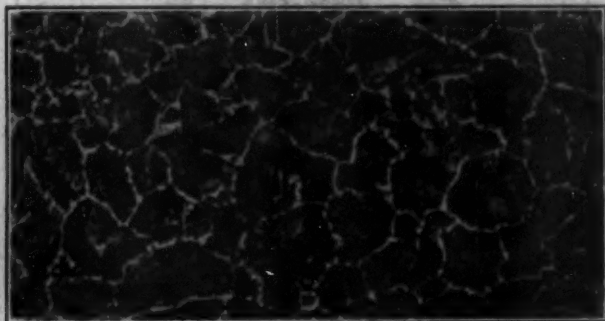


Fig. 18.—Steel as Rolled.

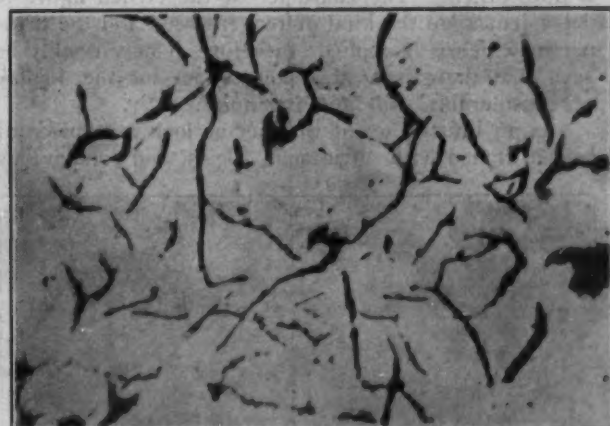


Fig. 19.—Carbon Segregation in Cast Iron.

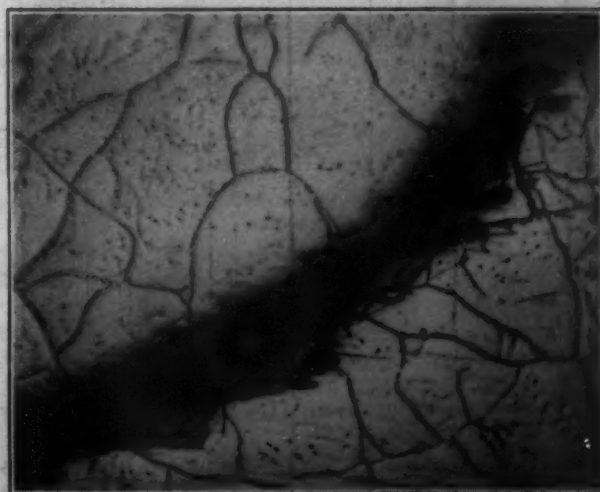


Fig. 20.—Slag in Steel, Polished in Relief.

adjustment is provided for by means of a set screw at the outer extremity of the arm.

In the back of the telescope tube is mounted a spherical bi-convex lens having a focal length of  $1\frac{3}{4}$  in., and in the front of the draw tube is a plano-convex lens having a focal length of  $1\frac{1}{4}$  in. The rear of the telescope tube carries a shield which is provided with clips to carry any desired color screen. Fastened to the shield is a light brass rod on which there is a movable carrier for an acetylene jet. This carrier consists of two pieces of brass tubing brazed together at right angles. Each piece of tubing is provided with a set screw so that the source of light may be moved up or down, forward or back, turned on its own axis and set in any position and at any angle with reference to the plane of the rear lens, a method of mounting which permits the use of any portion or all of the light from the thinnest edge to the fullest width.

The acetylene jet is connected by means of rubber tubing with any form of generator that may be convenient. In place of the acetylene lamp a small 6-volt tungsten light may be used, and, although electric

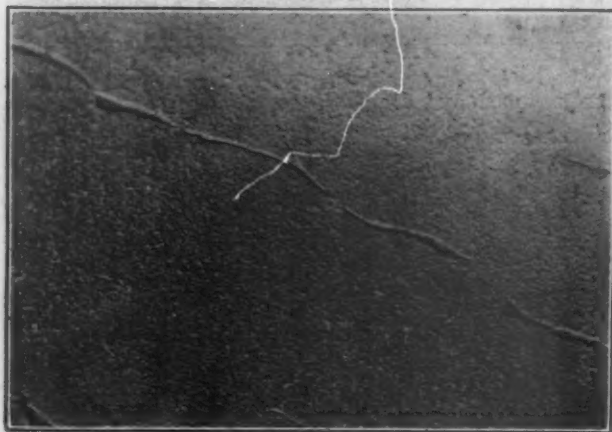


Fig. 21.—Phosphide Segregation in Steel After Treating with Cupric Ammonium Chloride.

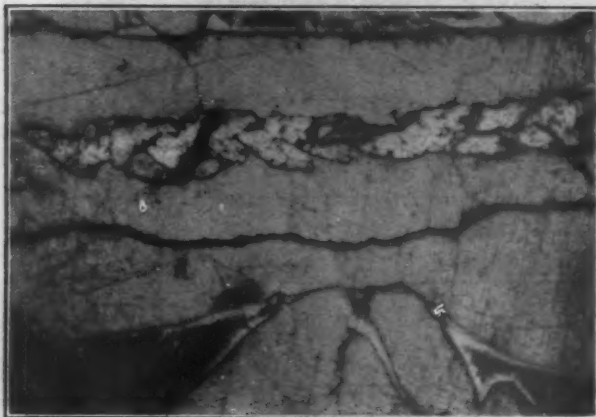


Fig. 22.—The Same Segregation Greatly Magnified After a Further Etching with Nitric Acid.



Fig. 23.—Sulphide Associated with Phosphide.

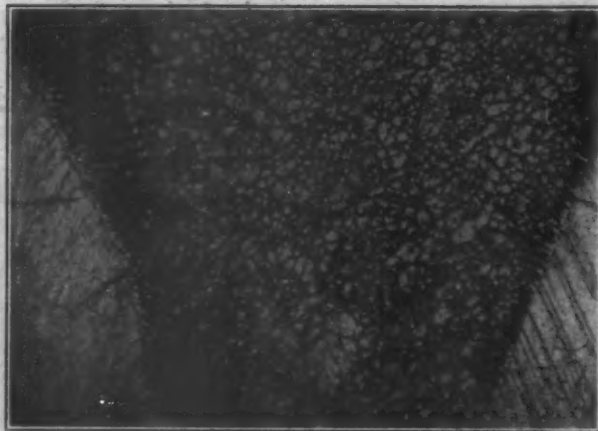


Fig. 24.—Sulphide Enveloping the Grain.

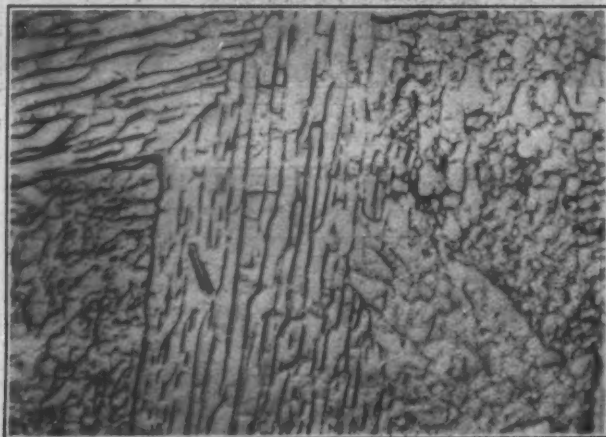


Fig. 25.—Segregation in Nickel Steel.

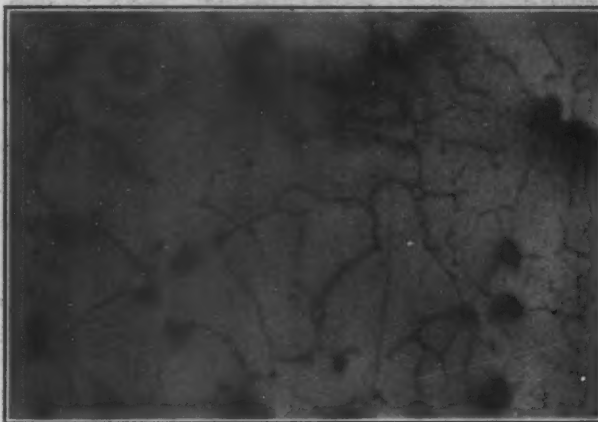


Fig. 26.—Oxide in Copper, Polished in Relief.

light does not possess all the advantages of acetylene light, experience has shown that it is a fairly satisfactory substitute.

Screwed into the collar of the arm of the condensing apparatus is a Bausch & Lomb vertical illuminator. Below this is a "quick acting nose piece" made by the same firm, which permits of a ready change of objectives without any change of alignment, and which experience has shown to be preferable to the "revolving nose piece." Fastened to the top of the microscope is a light-tight connecting tube, also made by Bausch & Lomb, inside of which is a sleeve to carry the eye-piece.\*

This apparatus lends itself readily for use with either "vertical" or "oblique" illumination, and permits the use of any power objective from the lowest to the highest. To illustrate this adaptability, a piece of wrought iron, Fig. 11, etched with nitric acid, is shown. The light with which this specimen was illuminated

\* Arrangement has been made with the Arthur H. Thomas Company, Philadelphia, to manufacture the apparatus here described.



was vertical; that is, it was passed down through the objective at right angles to its surface and back to the eye by reflection. Note the character of the field and the appearance of the various grains. Now let us look at the same section with an oblique illumination, Fig. 12, a most useful method for determining which con-

stituent is in relief. It can be obtained with this apparatus by simply shifting the set screw in the arm of the hanger, lowering the illuminator and then tilting the tube in its trunnion.

#### The Instrument as Applied to Metallurgy

Now as to some of the applications of such an instrument to metallurgy. It enables us to tell whether a steel casting has been annealed or not and the char-

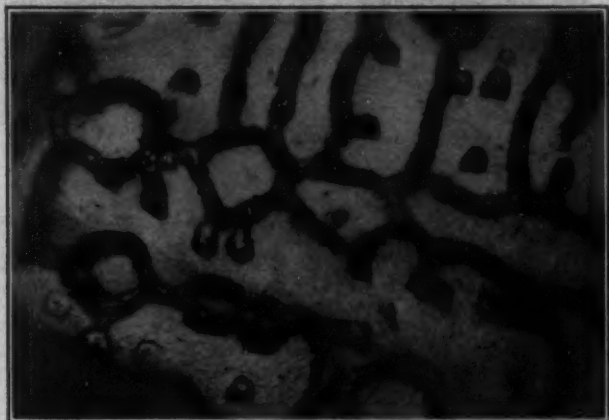


Fig. 27.—The Same as Fig. 26. After Etching and at a Higher Magnification.

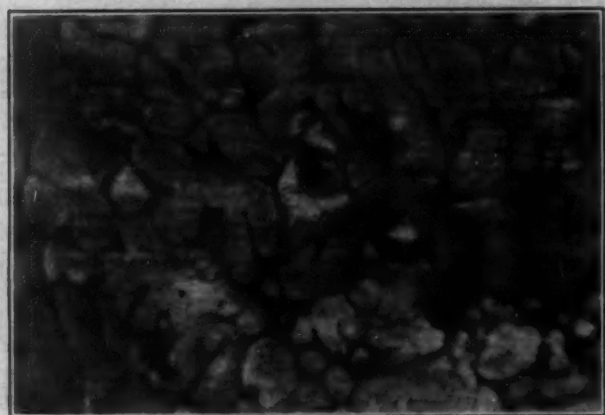


Fig. 28.—Copper.



Fig. 29.—Copper.

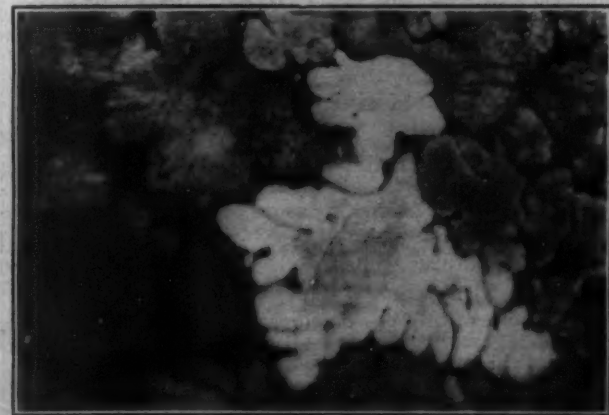


Fig. 30.—Copper.



Fig. 31.—Copper.

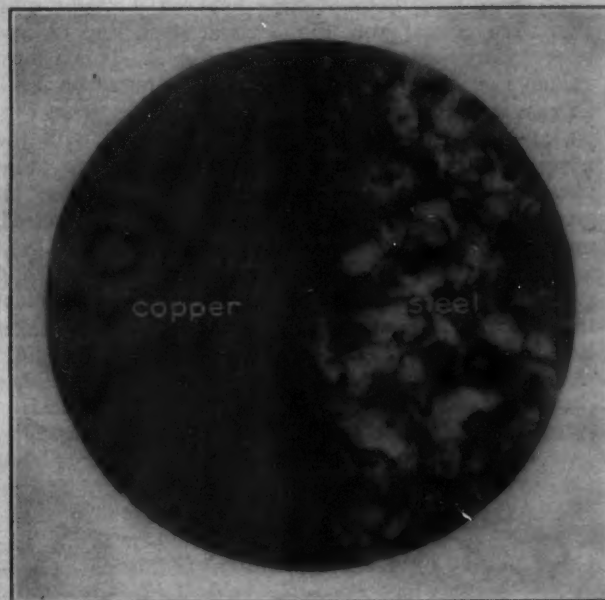


Fig. 32.—Cross Section of a 3 13-16 in. Copper-Clad Bar, Showing the Weld Area and Structure of the Steel.

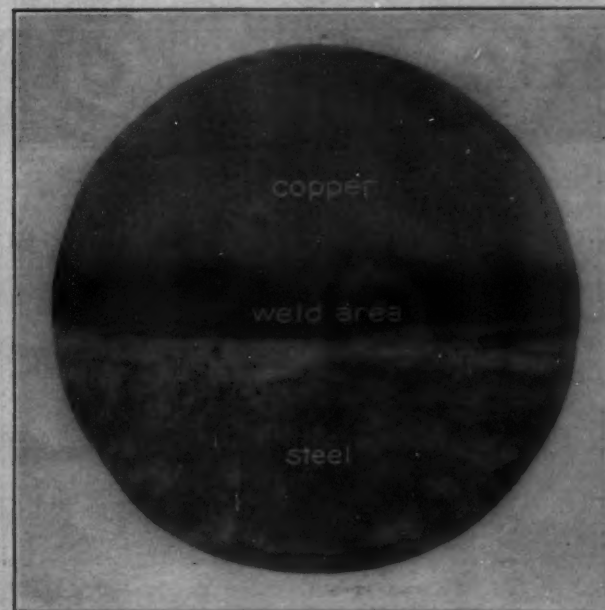
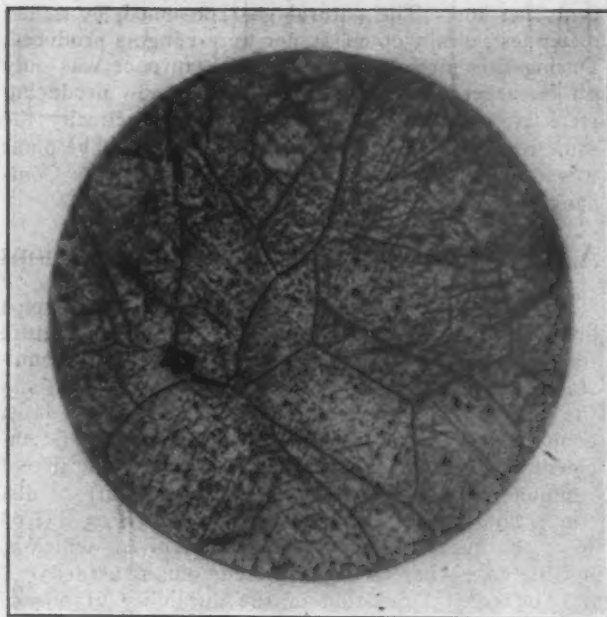
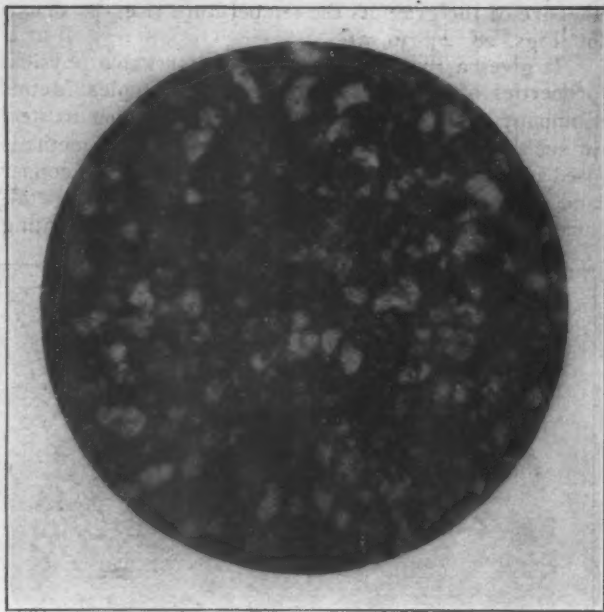


Fig. 33.—A 3/8 in. Copper-Clad Rod, with Three Compounds Visible in the Weld Area.

Fig. 34.—Cupride of Iron in Copper-Clad Steel ( $\times 1530$ ).Fig. 36.—Bare Steel  $\frac{3}{8}$ -In. Rod, Cross Section.

acter of that annealing, Figs. 13, 14, 15. It affords a ready means of distinguishing between wrought iron, Fig. 16; charcoal iron, Fig. 17, and steel, Fig. 18, and between gray iron castings and cast steel. It is a most valuable guide to the effect of heat treatment on steel. In cast iron it shows up the carbon segregations, Fig. 19, and other phenomena closely associated with the physics of that metal. In the study of segregation phenomena in steel and its attendant "fatigue," it gives a deal of information which, if properly digested, may lead to a remedy.

It shows up the presence of slag, Fig. 20, and segregations such as the phosphides of iron as illustrated by Fig. 21, which shows the phosphide segregation in relief after etching with cupric ammonium chloride. This particular section under a higher power, and after a further etching with nitric acid, is resolvable into at least three distinct compounds, Fig. 22, one of which is definitely crystallized and which I take to be the normal form of  $\text{Fe}_3\text{P}$ . It is interesting to note that this section suggests that phosphorus tends to segregate with some other metalloid, probably sulphur, and as a further illustration of this let us look at Fig. 23, in which the sulphide is plainly visible, and closely associated with the hieroglyphic markings of the phosphide. Not only does the sulphur tend to segregate with phosphorus, but it may segregate with

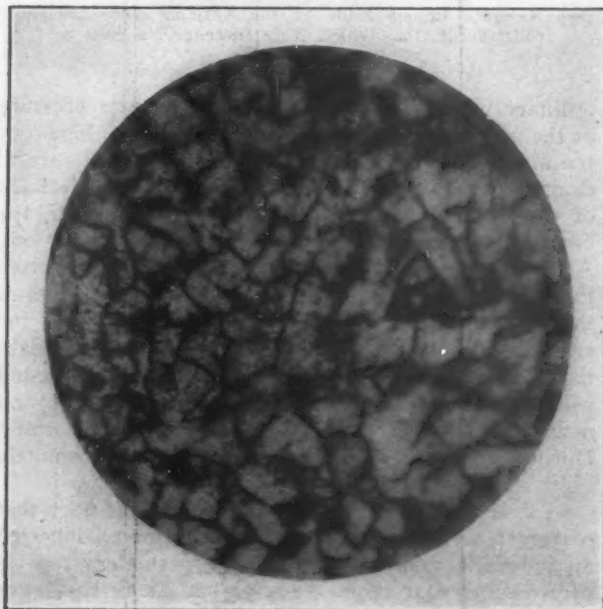
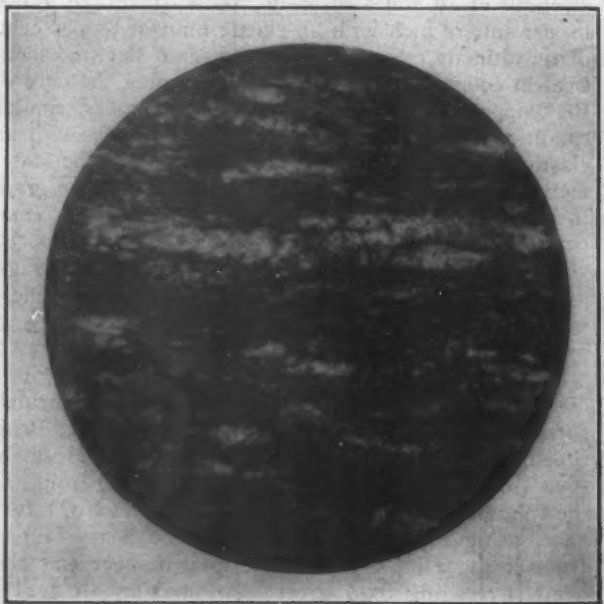
silicate or it may occur alone as occluded masses of manganese sulphide, or we may find it forming an envelope to minute occluded particles of steel, Fig. 24.

The microscope also gives a reason for failures which are otherwise difficult to account for, as may be shown in the illustration of a piece of nickel steel, Fig. 25, which failed under a very low stress, and it is well to note here the regularly arranged lines of strain set up by stress.

#### The Study of Nonferrous Metals

The microscope applied to the study of the non-ferrous metals and their alloys will give an amount of information that cannot be obtained by any other method. It gives us information as to the distribution of dissolved oxide and its influence on the metal in cold drawing, as shown in Fig. 26, which is a picture of a section of a wire rod in relief. The lines of oxide are plainly visible, and after etching and under a higher magnification they will show up as in Fig. 27, thus affording an explanation of why certain coppers, whose conductivities are good, yield weak and defective wire.

In the foundry it affords data as to the relation of the casting temperature to the physical properties of the product, in that there is a progressive increase in

Fig. 35.—Bare Steel  $\frac{3}{8}$ -In. Rod, Cross Section.Fig. 37.—Steel in Copper-Clad  $\frac{3}{8}$ -In. Rod, Cross Section.



the size of the grain as the temperature rises, as shown by Figs. 28, 29, 30, 31.

It gives a reason for the very remarkable physical properties of the product made by the Duplex Metals Company, which is successfully welding copper to steel in such a manner that it will stand the many methods used for working metals. The weld between the copper and the steel is perfect within the limits of a metallurgical process, as is shown by Fig. 32, illustrating

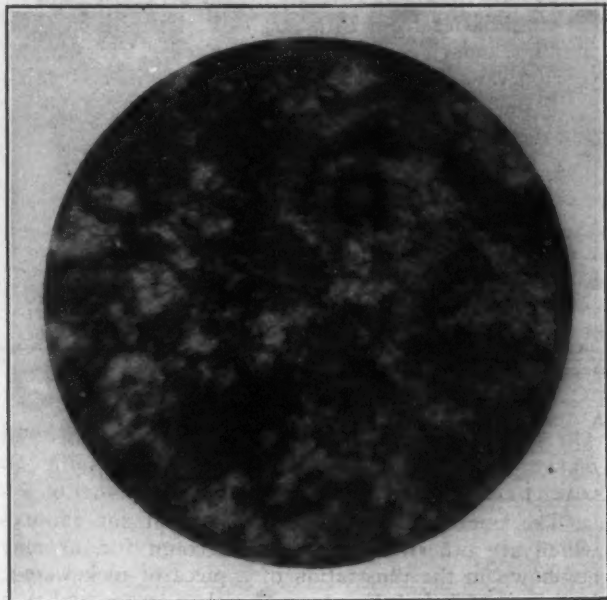


Fig. 38.—Steel in Copper-Clad  $\frac{3}{8}$ -In. Rod, Cross Section.

a 3 13-16 in. copper clad bar rolled from a 6-in. billet. On the one side you will notice the copper, whose structure is not developed; on the other, the steel, and between them you will notice the rootlets of the weld area penetrating the two metals and dovetailing them together.

Rolling this bar to a  $\frac{3}{8}$ -in. rod and developing the structure of the weld, Fig. 33, it will be noticed that there are at least three compounds visible in the weld area. On the copper side there is the copper-iron alloy; on the steel side there is the iron-copper alloy, and merging into each there is another substance which is very difficult to resolve, but which at a magnification of 1530 takes the form shown in Fig. 34, and which is assumed to be a cupride of iron rather than a eutectic.

The tensile strength of copper clad steel is noteworthy. Regarding the metal as having 40 per cent. of its sectional area made up of copper, its tensile strength in an annealed  $\frac{3}{8}$ -in. rod will average 55,000 lb. per square inch with an elastic limit of 82 per cent. of its ultimate. Steel rods of the same size and identical in composition with the steel forming the core of the copper clad, annealed and pulled under similar conditions, give between 54,000 and 56,000 lb. with an elastic limit of 74 per cent. Now accepting the statement that, other things being equal, the finer the grain in any metal the better its physical properties, a comparison of the structures of the all steel rod, Figs. 35, 36, with that of the steel in the copper clad rod, Figs. 37, 38, all of which are at exactly the same magnification, the extremely fine grain of the copper clad is at once apparent.

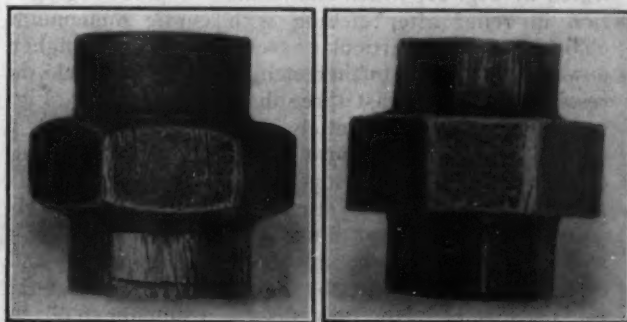
**An Open Hearth Furnace Record.**—The open hearth furnace plant constructed last fall for the West Penn Steel Company, Brackenridge, Pa., using cold stock, such as borings, turnings, light scrap and pig iron, has the following actual record to report on the No. 1 furnace, using natural gas as fuel: The heats ranged from 80 to 92 gross tons. The total number was 290 heats, averaging  $85\frac{1}{2}$  gross tons, making an aggregate of 28,537 net tons of ingots. The total cost of repairs during this operation was \$2550, equal to 8.9

cents per ton. The natural gas consumed, by actual meter test, was 5500 cu. ft. per ton of ingots produced. During this production of steel the furnace was only off for a period of four days, and it is now producing steel after this short shutdown with practically the same roof and walls of the furnace proper. The plant was designed and erected by the S. R. Smythe Company, Pittsburgh, Pa.

## A Durability Test of Kewanee Pipe Unions

Where there is a probability of a joint in a pipe line being disconnected and reconnected at some future time a pipe union is used, but only under those circumstances, as, if the idea is simply to make a joint, and the possibility of its being disconnected is remote, a coupling will serve the purpose just as well, and incidentally be much cheaper than a union. The use of a union joint, therefore, argues the possibility of disconnection and reconnection, and with an iron to iron joint the question of corrosion is involved, which is not the case where a brass to iron joint is used.

The general question of the durability of one of these unions is of considerable interest to users, and to secure data on this point the National Tube Company, Frick Building, Pittsburgh, Pa., recently made some tests with its Kewanee unions. While, of course, the exact number of times any joint can be disconnected and reconnected is dependent upon the circumstances of each particular case, the results of this test in a general way may be accepted as indicative of the behavior of this type of union under all conditions. For making this test a 1-in. octagon Kewanee union and a  $1\frac{1}{2}$ -in. round union were picked at random from the stock room and subjected to the following test: Each union was connected by a nipple, valve and a second nipple to a steam line, and into the other end of each union was screwed a nipple with a valve on its outer end. The union connection was tightened with an



$1\frac{1}{2}$ -In. Round Union.

1-In. Octagon Union.

Two Kewanee Unions Made by the National Tube Company, Pittsburgh, Pa., Which Were Disconnected Over a Thousand Times.

ordinary wrench and subjected to the steam pressure of the main. The outer valve was opened to blow out the air in the union and then closed. After a careful examination to make sure that there was no leakage of steam in the union the pressure was shut off, the outer valve opened and the steam allowed to blow out. After this the union ring was entirely unscrewed from the brass end. This operation was repeated over a thousand times on each of the unions and during the entire test neither showed the slightest sign of leaking steam. Upon completion of the test each union was subjected to the same test as that received by all new unions, namely, 110 lb. air pressure under water. During this test each of the two unions was absolutely tight and no air bubbles showed.

These tests brought out very clearly the fact that wherever a union is to be disconnected or reconnected an indefinite number of times the gasketless type is preferred to that requiring a gasket, as in the latter case delay is involved in cutting and fitting a gasket, and in addition the joints are not absolutely tight.

## Steel Barges for the Mississippi

### The Type to Be Built for the Transportation of Steel Products

In connection with the article in *The Iron Age* of April 7, 1910, page 798, on the use of lifting magnets in raising steel products sunken in the Mississippi River, reference was made to the introduction of steel barges in the traffic on that river, as affording greater assurance against losses. In case of breaking loose from the towboat and striking a sand bar or bridge, as

of steel. Steel billets have really pioneered the way, the fleet of 30 steel coal barges built by the American Bridge Company for the American Steel & Wire Company having for some years carried coal to the mills and on the return trip to the coal mines have taken billets from the Shoenberger Works to Rankin and Braddock.

It is of interest to note that 10 steel barges have just been ordered from the American Bridge Company to carry the products of United States Steel Corporation subsidiaries from Pittsburgh district mills to Cincinnati, Louisville, St. Louis, Memphis, Vicksburgh, New Orleans and other parts on the Ohio and Mis-

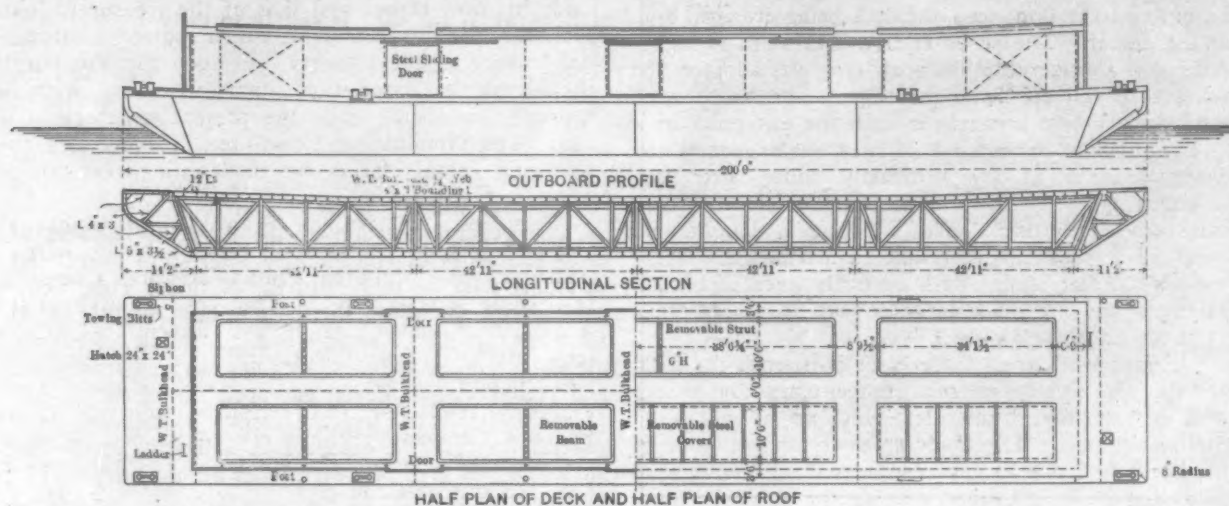


Fig. 1.—Outboard Profile, Longitudinal Section and Plan of New Steel Barges for the Mississippi River.

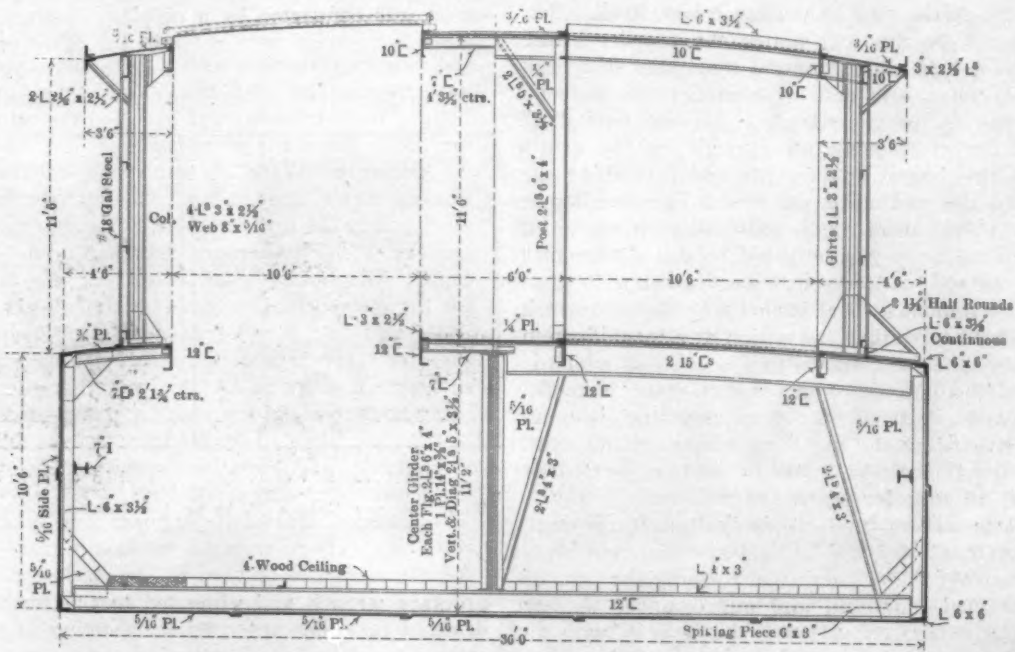


Fig. 2.—Midship Section, with Details of Steel Construction.

has happened with wooden barges, the all-steel barge is much less liable to be stove in and sunk. Now that the Government is making the Ohio and Mississippi navigable for a longer period in the year shippers are encouraged to provide craft in which cargoes of all descriptions can be most advantageously transported. In the past few years many barges and boats of steel construction have been built for various lines of river traffic and they have been found well adapted to the carrying of all-steel cargoes. Practically all such craft have been designed and built at the Ambridge, Pa., plant of the American Bridge Company. Thus far, however, they have been used more for transporting coal, oil, sand and other bulk commodities, for service at Government locks and dams, and for car ferries and other transportation enterprises than for the carrying

Mississippi rivers. Arrangements have been made with the Monongahela River Consolidated Coal & Coke Company to tow the barges. It is not unlikely that before these barges are completed the number will be increased to 25.

For some time steel rails, wire, nails, cotton ties, pipe, &c., have been carried to Southern ports by the Monongahela Consolidated Coal & Coke Company for the constituent companies of the Steel Corporation in wooden model barges, some of which are still in service. The amount handled in this way has been from 40,000 to 65,000 gross tons annually. The tonnage of steel rails alone has, however, been as much as 150,000 gross tons in one year. The average number of round trips for a barge at present is two a year, but with improved river conditions and continuous available



water this might be increased so that each barge would make at least five round trips to New Orleans annually and a correspondingly larger number to intermediate ports. With such service at least 250,000 gross tons of steel products could annually be distributed from the Pittsburgh district to Ohio and Mississippi River ports. In fact, with improved facilities for shipment at the mills and for receiving, storing and forwarding at the important ports the volume of business might come close to 500,000 gross tons.

The accompanying illustrations show the type of barge being constructed, Fig. 1 showing an outboard profile, with plan views and longitudinal section, while Fig. 2 is a midship section with details of steel construction. The barge is 200 ft. long over all, 36 ft. beam and 10 ft. 6 in. deep, the deck being crowned 8 in. at the center. The sheer at bow and stern is 18 in. After due consideration the scow type was adopted, the rakes fore and aft being the same. The barge is of steel construction throughout with the exception of a 4-in. wood floor in the hold. Plates, angles, beams and channels, such as are ordinarily rolled, are used throughout, no special section being employed. Five transverse watertight bulkheads and a longitudinal truss divide the hold into eight compartments. Openings are located in the deck centrally over each compartment and are made large enough to receive rails 33 ft. in length below deck.

A cargo box covers the greater portion of the deck, and this also is built entirely of steel plates and shapes with the exception of the sides, which are of galvanized corrugated steel. Three sliding doors on each side of the barge and one at each end permit of loading and unloading nails and other wire products, ample space having been provided for trucking the material on the deck. Provision has also been made for loading materials through the roof of the cargo box, hatches having been provided immediately over the deck openings so that rails, pipe and structural material can be lowered by a crane through both openings into the hold. It will also be possible readily to load 60-ft. rails and 70-ft. structural material through the two central roof hatches. Such material, however, will be carried on the deck and not in the hold. The roof hatches have steel plate covers, amply stiffened with angles and designed so as to be weatherproof. As it is customary to carry mixed cargoes, it was necessary to make barges of sufficient cubical capacity to carry the bulky and comparatively light material such as field fencing and barbed wire, and when such cargoes are carried a cargo box will be required. For rails, pipe and structural material, if not over 33 ft. long, the hold only will be needed, but for the long lengths of structural material and rails the deck will be used, although other materials can also be carried in the hold. The draft of the barge loaded to its capacity is 9 ft., provision having been made for 18 in. freeboard. The barge light will draw 26 in.

The American Bridge Company has recently completed three barges for carrying bulk oil for service at New Orleans, ten coal barges, a wharf boat at Memphis, and two 14-car transfer barges in use at Profit Island in the lower Mississippi River, conveying gravel for ballasting several hundred miles of track for the Illinois Central Railroad. Four barges are now being built to be used by the United States Government at Greenville, Miss., for river maintenance work, and a steel floating drydock, also for the Government, at Vicksburg, Miss.

The G. M. Yost Mfg. Company, Meadville, Pa., has purchased the plant of the Williamson Vise Company, Bradford, Pa. The entire outfit of the latter will be moved to Meadville at an early date. The G. M. Yost Mfg. Company makes a complete line of vises for machinists, patternmakers, woodworkers, blacksmiths, jewelers and toolmakers. The consolidation will enable the company to increase greatly its output.

## The Pittsburgh Foundrymen's Association

The Pittsburgh Foundrymen's Association, which usually meets the first Monday of each month, advanced its date this month to Friday, June 3, so as not to conflict with the Detroit meeting of the American Foundrymen's Association, which quite a number of the local foundrymen will attend. The meeting was held in the Fort Pitt Hotel, Pittsburgh. A dinner was first served, at which the attendance numbered 43, President Joseph T. Speer acting as host. At the business meeting, which followed, an application for membership from the Coshoccon Iron Company, Monongahela, Pa., was received and accepted. The secretary made his own report and that of the treasurer, John McLaren, for the fiscal year, which showed a substantial balance in the treasury. In 1909 the Pittsburgh Foundrymen's Association numbered 107, with 4 honorary members, while the present membership is 130. The Nominating Committee recommended the following list of officers for the ensuing year, all of whom were elected:

President, J. S. Seaman, Seaman-Sleeth Company; vice-president, W. A. Bole, Trafford City Foundries; treasurer, John McLaren, Phillips-McLaren Company, re-elected; secretary, F. H. Zimmers, Union Foundry & Machine Company, re-elected. Executive Committee—Joseph T. Speer, Pittsburgh Valve, Foundry & Construction Company; O. W. Mason, Midland Steel Company, re-elected; Henry Spilker, Sterritt-Thomas Foundry Company; William H. McFadden, Mackintosh-Hemphill Company, re-elected; J. S. McCormick, J. S. McCormick Company.

The retiring president, Mr. Speer, delivered a valedictory address, in which he referred to the good results accomplished during the year, the loyal support given him by the other officers that made this possible, and extended his best wishes to the new president, Mr. Seaman, who then took the chair. On motion of H. E. Field a vote of thanks was given to the retiring officers for their successful administration.

Arthur T. Waterfall, president of the American Foundrymen's Association, was introduced, and outlined briefly the programme for the Detroit convention. Dr. Frank T. Stephenson, chairman of the Detroit Reception Committee, gave details of the arrangements for the convention, the foundry supply exhibition, &c., and stated that it had been necessary to draw on Chicago for carpenters and pay them double time, owing to shortage of labor in Detroit, and that everything was being done to make the affair a grand success.

Dr. Richard Moldenke, secretary of the American Foundrymen's Association, spoke entertainingly about his recent trips abroad, during which he visited Norway, Sweden, Denmark, Germany and other European countries. He referred to the vast number of relics of the Stone Age to be seen in Denmark, the importation of castings into that country from Germany, the high rate of taxation there and the meeting of the International Congress for Testing Materials in Copenhagen. At present there is no uniformity in the different countries on the length of cast iron test bars, some using short pieces while others use up to 20 in. In his opinion a bar of about 16 to 18 in. should be adopted as a standard. He stated that European exporters are now paying more attention to the grading and selling of pig iron on an analysis basis. His description of the briquetting of cast iron borings for cupolas and the briquetting of ore and copper in Germany was received with interest. He also alluded to the Detroit convention and the indications of its importance.

A telegram was forwarded to President Taft urging the appointment of Dr. Joseph A. Holmes as director of the new Bureau of Mines.

Pittsburgh has plans well matured to secure the meeting of the next convention of the American Foundrymen's Association in Pittsburgh.

# The Shockless Jarring Machine\*

## A New Type of Machine to Increase Production and Reduce Cost

BY WILFRED LEWIS, PHILADELPHIA, PA.†

The term "shockless" applies only to the foundation or support on which the machine stands. The jarring machine is essentially a sand packing machine, capable of ramming any mold, large or small, in a minute or less time. The sand is rammed densest at the surface of the pattern and of decreasing density above, thus favoring the escape of gases when the mold is poured. The packing of the sand results from impact between the table on which the mold is carried and the anvil on which it drops. Various means may be used to lift the table and let it drop, but in foundry work compressed air has come to be generally preferred for its convenience as a medium for the transmission of power, and also for the simplicity of the machines resulting from its use. The jarring machine is not uni-

ming time, and the power squeezer saved a little more, but not so much in time as in the strength of the operator, keeping him fresh, with steady hand and eye, for the delicate work of drawing patterns and setting cores. Pattern guides were then devised to assist in drawing patterns, and vibrators were invented to free the pattern from the sand without appreciably enlarging the mold. The use of molding machines on small work has resulted in a substantial saving in the cost of molding, less wear and tear on patterns, and greater uniformity in castings, the saving in weight of the castings due to the use of a vibrator being sometimes an item that soon pays for the installation of the machine.

The hand squeezer is limited in its application to what can be done at one effort by one man, and for larger work power squeezers have generally been employed; but when large molds are squeezed by power, more or less trouble is encountered in the distribution of pressure on the sand. At one time an effort was made to overcome this difficulty by means of a water bag placed between the sand and the squeezing head. Better results were obtained, however, by judicious tucking in deep pockets, by heaping the sand over deep places, and by scooping it out over high points in the pattern; but the main difficulty in squeezing deep molds lies in the fact that the sand is generally moved against the pattern instead of the pattern against the sand. This results in the greatest density of sand being away from the pattern, next to the squeezing head, and not where it should be, next to the pattern.

The friction of sand on the sides of a deep flask may carry a large part of the pressure on the squeezing head, and to avoid this difficulty bottom ramming machines have been employed, which move the pat-

tern against the sand, but this method contemplates a definite, predetermined movement of the pattern to produce a mold of the density desired, and is subject to variations not easily controlled. Bottom ramming has, therefore, not been adopted to any great extent, and power squeezers have usually been limited in application to flasks not more than 2 to 3 ft. on a side by a foot deep. Such machines, when designed also for pattern drawing, are comparatively expensive and have marked for a time the limitations of machine molding.

During recent years, however, the jarring machine has grown steadily in favor and in size, until to-day there would seem to be no limit to its capacity. These machines are simple in construction and effective in operation, while on large work the saving to be effected by their use probably exceeds that by all other types combined. I say on large work, because on small work jarring machines cannot compete with power squeezers of the same capacity, except perhaps in a few special cases where the work is deep.

### Value of Labor Saving Appliances

The value of any machine depends, of course, on what it can save, and what it costs to effect that sav-

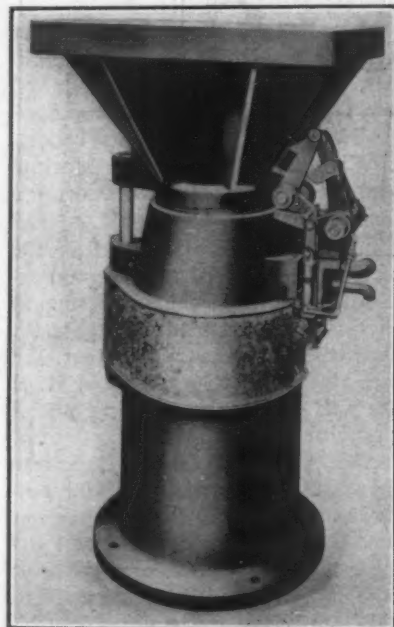


Fig. 1.—Exterior View.

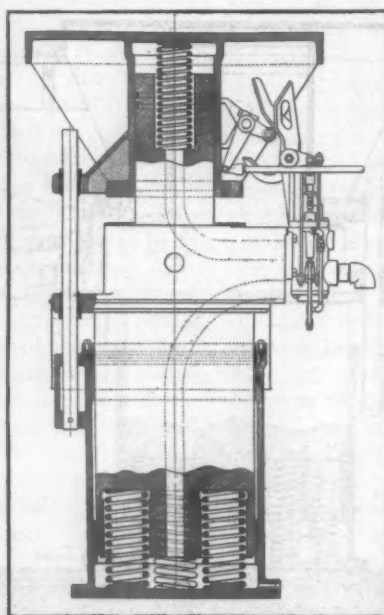


Fig. 2.—Sectional Elevation.

Two Views of the Shockless Jarring Machine Built by the Tabor Mfg. Company, Philadelphia, Pa.

versal in its application, nor should it be used without judgment and discrimination. Due regard must be given to the construction of the pattern so as to permit a flow of sand chiefly in one direction, and to withstand successfully the shock of impact in ramming. But, for the broad field of work adapted to its use, there is nothing comparable to the jarring machine as a saver of time and money.

### Development of Machine Molding

Jarring machines have been in practical use for many years without attracting much attention. The records of the patent office go back to 1869; but like all other types of molding machines, they have never been made, until quite recently, for large, heavy work beyond the strength of one or two men to handle. It was quite natural that the molding machine should begin its development in a small way on small work; as the field has widened it has been seen that the possibilities for saving time and money in the foundry have increased with the size of the work adapted to machines. The hand squeezer saved some of the ram-

\* Presented at the Spring meeting of the American Society of Mechanical Engineers, Atlantic City, N. J., May 31-June 3.

† Tabor Mfg. Company.



ing; a problem to be worked out in every instance by a systematic time study of all the operations embodied in producing a given result. For instance, if it takes two men eight hours to mold by hand a certain pattern, in a flask 45 x 60 x 36 in., and if five hours are consumed in ramming sand, a jarring machine would save practically all of this. It would not save any of the pattern drawing and finishing time, nor any of the time for setting cores, but it would enable two men to make the mold in three hours, instead of in eight hours by hand. Hence, with a suitable jarring machine two men could put up 2.67 times as much work as by hand.

In this case the jarring machine saves more than half of the molding time, and is, therefore, the most important help in the reduction of cost; but when patterns are rapped with a sledge, and drawn with a crane or hoist, a great deal of the molder's time may be taken up in finishing the mold. If one hour is spent in finishing each half-mold when made by hand, an effective pattern drawing machine could easily save two hours; and with such a machine two men could make a mold in six hours, thus increasing their rate of molding 1.33 times. With a sand conveyor, or even a clam-shell bucket on a traveling crane, perhaps 30 min. could be saved, thus enabling two men to make the mold in seven and a half hours, thus making the rate of molding 1.067 times as fast.

To illustrate the effect of concentrated effort upon any given piece of work, assume that the demand for the castings above referred to has resulted in the making of three sets of patterns, and three sets of men are at work making three molds a day by hand. If one set of men is given a jarring machine, another a pattern drawing machine and the third a sand conveyor, in eight hours the groups will produce 2.67, 1.33 and 1.067 molds, respectively, or the six men with three patterns will produce 5.067 molds, or about 1.7 times as much work. On the other hand, if there is but one pattern and one set of men, and they have the combined help of a jarring machine, a pattern drawing machine and a sand conveyor, they will save five hours in ramming, two hours in finishing and half an hour in shoveling sand; bringing the time on one mold down to 30 min., and increasing the production 16 times. In other words, the same assistance concentrated for the benefit of two men will result in more than three times the production, at less than one-ninth the cost per mold. The above illustration shows not only the advantage of concentrated effort in the use of labor saving appliances, but also the wide difference in results that may be realized from the same appliances in different hands, which in this case were saving the wages of four men and producing three times as much work, and also distributing the indirect charges over a larger output.

On the other hand, the interest on the investment,

the depreciation of the machine and the consumption of power must be accounted for, and in addition the damage that may be caused by the action of the jarring machine upon finished molds, or even upon neighboring buildings, and the annoyance caused by noise and ground waves generally. This damage and annoyance has increased steadily with increase in the size of the machines and the weight of the loaded table. To meet these serious objections various expedients have been adopted, among which may be mentioned a reduction in the stroke or drop, and a more or less resilient bedding for the anvil.

#### Principles Governing the Design of a Jarring Machine

These palliatives, however, left much to be desired until the shockless jarring machine, with its anvil rising up to meet the falling table was developed. This has eliminated the chief objection to jarring machines. It is the object of this paper to elucidate the principles upon which it works and to establish its claim to su-

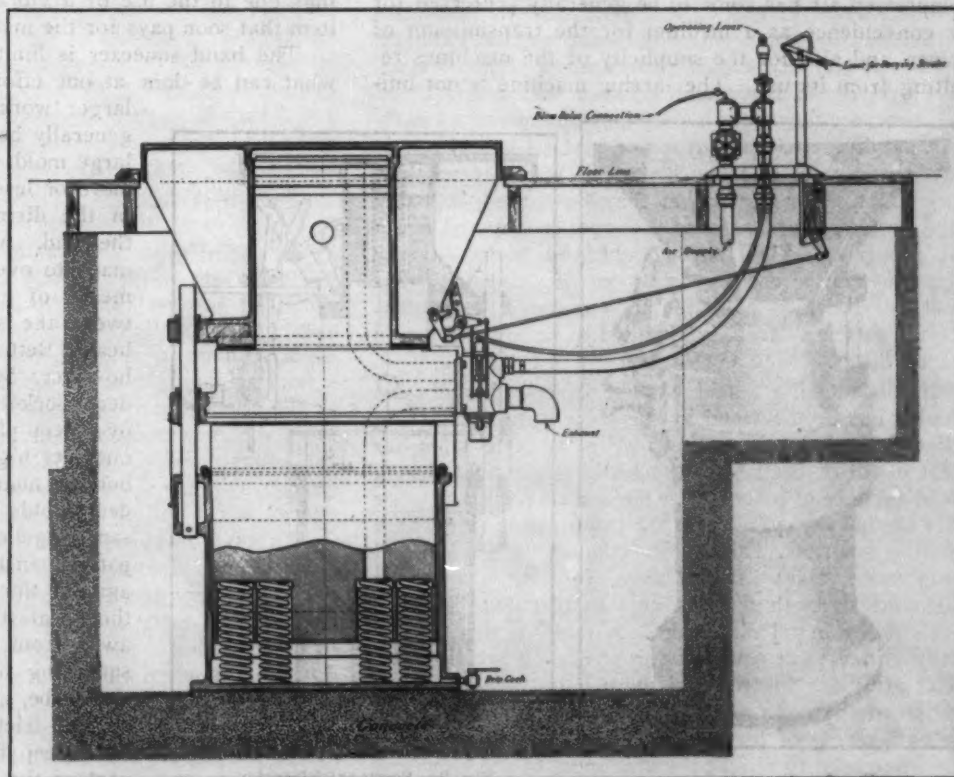


Fig. 3.—Sectional Elevation of a Machine Designed to Handle Molds Weighing 25 Tons.

perior efficiency in the consumption of power. Although the packing of sand by the jarring process is very quick and effective in producing results, it is not very efficient under the most favorable conditions, as regards the expenditure of power, and under certain conditions this may be reduced to zero. In the process of ramming, the density of sand is increased 25 or 30 per cent., and if a steam indicator were attached to the cylinder of a power squeezer, it may be questioned whether it would ever show over 1000 ft. lb. per cu. ft. as the work actually done on the sand in squeezing it to proper density, although of course a great deal more power than this would be consumed in the use of water or air as a working fluid.

To produce the same effect by jarring, the sand might be raised to a height of 4 in. and dropped upon an anvil 30 times; but to the weight of the sand must be added the weight of the table and flask, and the excess sand used as an aid in ramming. The first blow struck will cause the greatest flow of sand while each succeeding blow will increase the density until, after a certain number of blows, the sand will remain at a density corresponding to the drop. The jarring machine is therefore more efficient during the earlier

stages of the process than it can be when the condition of maximum density is approached; and for this reason, the longer the stroke the greater will be the efficiency. Other considerations of a practical nature necessarily tend to limit the stroke, so that in practice it varies from  $\frac{3}{8}$  in. on some machines to 4 in. or more on others, with an average of perhaps  $2\frac{1}{2}$  in. In such machines the most important consideration is solidity of construction and freedom from vibration of the jarring table. Otherwise the sand will become broken or laminated and the mold will be liable to fall apart in handling. Although lightness of construction in the jarring table is obviously desirable from the standpoint of economy in power, it is certainly not desirable from the standpoint of making perfect molds. The good results accompanying the stronger and stiffer table really cost less and consume less power in the end, because there are no failures necessitating repetition, or molds to be thrown away. The importance of solidity in the jarring table will be appreciated after a consideration of the character of rammed sand. It has a certain amount of elasticity, a good deal of resistance to further compression, and some tensile strength, which of course is easily overcome. There must, therefore, be no movement between the pattern, sand and flask, tending to pull the sand apart, and of sufficient amplitude to cause fracture, and no lateral movement tending to slide one layer of sand over another. Such fracture or lamination may be caused by badly fitted pattern boards, flimsy patterns, or crooked flasks not properly bedded, but a light and flimsy jarring table that can be easily warped out of shape will augment the difficulty and effectually prevent the success of good patterns carefully mounted in strong and firmly bedded flasks.

In the molding machine to be described, the table adopted has been formed in one piece with the jarring cylinder, as shown in section in Fig. 2. This table has great depth of beam, and the metal is distributed in a broad expanse of plate on the tension side and a smaller mass around the cylinder on the compression side where the blow is struck. Radial ribs connect the tension and compression sides of the beam, forming a table of enormous strength and stiffness to distribute the impact equally in all directions. A table of this type is really stiffer than some of the anvils on which other tables are made to drop and there is no perceptible vibration of the table when it strikes its anvil, or rather the buffer ring of leather, or other nonresilient material, interposed to relieve the sharpness of the blow and to reduce the noise. This buffer also helps to reduce vibration and rebound by reducing the intensity of the force of impact. It is not the rebound of the table from its anvil that injures a mold, but the rebound of the flask and sand from the table. Solidity of contact between table, pattern board and flask is one of the most important elements for the successful working of a jarring machine; yet it rarely receives the proper attention and not unfrequently the machine is condemned for this reason.

Unlimited power may be expended in jarring sand to any given density, and since there is a certain maximum density corresponding to any given drop, it is also quite evident that efficiency increases with the drop and decreases with the dead weight handled over and above the weight of sand used. A certain amount of dead weight is inseparable from the process, and, therefore, a heavy machine may not be used to its best advantage on light work. Nevertheless, with air as a working fluid the benefit gained by expansion on light work offsets to a great extent the loss from the greater proportion of dead weight carried, giving to the jarring machine which uses air expansively quite a wide range of capacities under approximately uniform efficiency in the consumption of air per cubic foot of sand rammed. At the instant the loaded table strikes its anvil the sudden change in velocity measures the pres-

sure of impact, and the ramming effect is measured by the square of that change in velocity, which is proportional to the energy absorbed, part of which is utilized in ramming sand. Therefore, the greater the change in velocity at the instant of impact the greater the ramming effect and, by the laws of impact, the heavier the anvil the better. Efficiency in a plain jarring machine naturally increases with the weight put into the anvil; but the weight of the anvil is generally limited to that of the loaded table. When the anvil is bedded on rock it becomes practically of infinite weight and capable of developing the maximum ramming effect for any drop given to the table. A rock bottom does not eliminate the destructive ground waves, but facilitates their transmission. To mitigate the effect of these shocks the practice has been to bed the anvil on a timber cribbing, after the manner employed for steam hammers.

#### Efficiency Depends Upon the Anvil

An anvil so cushioned when struck by a loaded table of its own weight will acquire one-half of the velocity of the table at the instant of impact, after which both the table and the anvil will be brought to rest by the yielding resistance of the timber cribbing and returned to their normal position by its elasticity. The loaded table loses at the instant of impact only one-half of the velocity it would lose by falling upon an anvil of infinite weight, and as a result the retardation of the table by the compression of the wooden cribbing is less intense and less effective in ramming sand, although this second change in velocity no doubt has some effect, especially in the earlier stages of the ramming process while the sand is comparatively soft. The initial change in velocity, between a loaded table and a floating anvil of equal weight, is only half as great as the change in velocity of a loaded table falling the same distance upon an anvil of infinite weight; and the ramming effect in the first instance is only one-quarter as much as in the second case, where the whole energy in the falling mass is immediately absorbed.

An anvil cushioned upon a wooden crib may be considered as a floating anvil, in which the supporting medium is very dense and highly resistant, but in which also the resistance to compression is trifling compared to that of rock. The stiffness of such an elastic bedding for an anvil might be estimated from the anvil movement, of which no data are at present available; but, however effective it may be in the initial stages of the jarring process, it can have but little effect upon the final stages after the sand has been rammed to a density in excess of that corresponding to such elastic resistance. Anvils cushioned upon wooden cribbing are much less effective than anvils founded on rock, and such anvils, equal in weight to the loaded table, have in the final stages of the jarring process a comparative efficiency of only 25 per cent.

In considering the mechanical efficiency of a jarring machine it is therefore a matter of some importance to provide an anvil of maximum efficiency for any given weight. The heavier the anvil is in any case the better, and the unit standard for all anvils may be one of infinite weight. Such an anvil stands for the highest attainable efficiency, but it is not a practicable construction on account of the destructive ground shocks, which the shockless machine eliminates.

#### General Description of the Shockless Jarring Machine

The shockless jarring machine consists of a jarring table mounted upon an upstanding plunger forming the anvil, which in turn is mounted in a cylinder base and supported upon long helical steel springs. Compressed air is admitted through an automatic valve, under hand control, attached to the plunger, and passes first into the jarring cylinder to raise the loaded table. At some predetermined point in the table movement, the air is automatically cut off from the cylinder, and, while the valve is reversing, the confined air will expand and



lift the table further from its anvil, provided its initial pressure exceeds the balancing pressure due to the weight carried. When the operating valve completes its reverse movement the air from the jarring cylinder may be exhausted into the atmosphere, but preferably it passes from the jarring cylinder to the anvil cylinder beneath, and the table drops by gravity against the reduced pressure in its cylinder. At the same time, the plunger base or anvil is relieved of a considerable part of the load carried by its supporting springs, which immediately expand, giving the anvil an upward velocity to meet the falling table. When air is expanded from the jarring cylinder into the anvil cylinder this upward velocity of the anvil is augmented and the falling velocity of the table is somewhat retarded, but in any case the momentum of the rising anvil is substantially equal to that of the falling table at the instant of impact. As a result, both table and anvil come to rest with great jarring or ramming effect upon the sand, but without shock or jar upon the foundation.

When the air from the jarring cylinder is discharged at once into the atmosphere the momentum of the falling table may somewhat exceed that of the rising anvil at the instant of impact; but when this air is expanded into the anvil cylinder it compensates more or less for the loss of spring pressure as the anvil rises, and in this case the momentum of the rising anvil may exceed that of the falling table at the instant of impact. The difference, however, need not be very pronounced, and simply results in a slight initial velocity of the table and anvil at the beginning of the next stroke.

The advantage of the second expansion is two-fold: it utilizes the potential energy of the compressed air in augmenting the momentum of the anvil, and at the same time it checks the acceleration of the table due to gravity and holds it in contact with the load upon it while falling. When the air is discharged directly from the jarring cylinder, a long compression spring between the jarring cylinder and its plunger may be introduced with good effect. In several instances such springs as those shown in Fig. 2 have been made to carry half the weight of the table with 8-in. compression. They assist in lifting the loaded table and retard its acceleration in falling; and by their use the lifting capacity of jarring tables may be considerably augmented. Their chief purpose is to retard the falling table and hold the pattern flask and sand firmly against it in readiness for the coming blow. With such a spring the action of the table is somewhat slower in falling and more stroke is required to produce a given velocity of impact. The table rises faster and runs further to produce a given blow and the increased stroke reduces the percentage of clearance space to plunger displacement. The spring in this position has some beneficial effect upon the consumption of power, while serving a much better purpose in the production of good molds, and although not so important when the air from the jarring cylinder passes through the anvil cylinder it may be of some value in that case also.

The machine is started and stopped by an operating lever which controls the admission of air to the automatic mechanism, and while this lever is held down the machine will run automatically, stopping when it is released. A latched lever is arranged to adjust the stroke, which can be varied while the machine is running, and a safety stop is provided to limit the table movement. When pressure is admitted to the jarring cylinder the anvil cylinder opens to exhaust, but in action it descends while the table is rising.

Fig. 1 represents the design of a machine now being built for a large foundry to handle half-molds weighing 25 tons. The table is a steel casting 8 x 12 ft., with a lifting cylinder 3 ft. in diameter, and the plunger base forming the anvil is a solid iron casting weighing 65,000 lb. This is carried upon 22 steel springs, designed to compress 8 in. under the maximum

load and to develop a working stress of only 60,000 lb. per sq. in., which is quite within safe limits. The total weight of the machine complete will probably be in excess of 90,000 lb. The earthquake from a loaded table weighing 65,000 lb., dropping 2 to 3 in. upon an anvil bedded in the ground, would not only undo the work done by the machine, but a large area of valuable floor space in its vicinity would become useless and office buildings at a considerable distance might vibrate in sympathy. In this instance a comparatively small jarring machine of a well-known type, with anvil mounted on wooden cribbing had caused more or less annoyance to the occupants of office buildings in the neighborhood, and the machine above described was designed to avoid any further trouble.

It has been shown that a floating anvil which does not rise to meet the falling table, when equal in weight to the latter, has only one-quarter the efficiency of an anvil founded on rock. The efficiency of such an anvil when mounted and actuated so as to acquire a momentum equal to that of the falling table at the instant of impact, remains to be determined. Obviously, the anvil will meet the table midway when the latter has fallen half the distance by which they were separated. In terms of the velocity of the table falling the whole distance, its velocity at this point will be  $\sqrt{\frac{1}{2}}$ , and the velocity of the anvil will be the same; but in this case the velocity of the table is entirely destroyed, while in the previous assumption the change in velocity at the instant of impact was only half the final velocity. The relative changes in velocity are, therefore, as  $\sqrt{\frac{1}{2}}$  to  $\frac{1}{2}$  and the ramming effects in the two cases will be to each other as the square of  $\sqrt{\frac{1}{2}}$  to the square of  $\frac{1}{2}$ , or as  $\frac{1}{2}$  to  $\frac{1}{4}$ . Under the assumed conditions the anvil in the shockless machine is therefore twice as efficient as the same anvil cushioned on a wooden crib.

The loss of power in cylinder clearances is well known, and the obvious remedy of a short passage from the valve to the cylinder has led to the use of internal valves of more or less ingenuity and efficiency. The air consumed in the clearance passage to the jarring cylinder is not wholly wasted. It adds materially to the work done by expansion in the jarring cylinder, and again, when discharged into the anvil cylinder it adds to the momentum of the anvil. In addition to the consumption of air for any given stroke, it must not be forgotten that the blow struck in the shockless machine is twice as effective as the blow for the same expenditure of power in the usual type of machine.

#### Special Adaptability in High Buildings

Attention should also be called to the possibility of installing a machine of the shockless type on the upper floors of high buildings, where many foundries are now being located. The action of the machine is entirely free from jar except where it is wanted, on the work produced, and the pulsating variation in floor load while running is no greater than is usually experienced in the operation of power squeezers. A number of these machines are now under construction for installation on upper floors, and in this connection it may be of interest to note that the original machine was set up on floor beams over a pit and operated without any vibration appreciable to a man standing on the beams while ramming up a half-mold weighing about 1000 lb. In this case the weight of the machine was about 6000 lb., and a stroke of 4 in. was employed. As the movement of the anvil was about 1 in., it met the table when the latter had fallen about 3 in. The variation in the load on the floor beams was about 10 per cent. of the static load carried, or between 600 and 700 lb., and was gradual, the anvil rising and falling with the movement of the table. When impact occurred, the load on the floor beams simply ceased to decrease, and began again to increase without transmitting to them any part of the shock of impact, which was confined exclusively to the jarring table and its base.

## A New Quick Dumping Ore Car

### A Recent Product of the Pressed Steel Car Company Which Is Self-Clearing

Transporting ore from the mines to the docks on the Great Lakes and the unloading of the cars at that point has always been an important factor in the economical production of iron and steel. The railroad companies have endeavored as far as lay in their power to reduce the cost of transportation and the final cost of the ore at the furnaces by having cars and docks designed to facilitate rapid unloading of the cars and loading of the ore to vessels which carried it over the Lakes. The development of the cars has been along the line of greater capacity and greater rapidity of unloading, but this has been hampered by the construction of the docks, which are built with pockets at regular short intervals corresponding to the distances between the hatches on the vessels, and this dimension determined the size of the old wooden cars formerly used. No changes can be made without re-

tom opening has been made very large, about 50 sq. ft., and the slopes of the hopper sheets have been made very steep, being 50 and 60 degrees from the horizontal at the ends and sides, respectively. This was brought about without materially reducing the carrying capacity of the cars by increasing their height and width, reducing the wheel base of the trucks and spreading them farther apart.

The door opening is closed by two doors hinged at the sides, which also form a part of the vertical sides of the car. In this way when the doors are opened part of the sides as well as the bottom falls away from the load and makes a large and unobstructed opening, which, it is said, reduces the chance of bridging to a minimum. The doors meet on the center line of the car, and each is supported by two 6-in. channel bars to which the door-operating gear bars are attached. The gear controlling the movement of the doors is designed to be operated from either side of the car, and is so arranged that when the doors are closed and the car loaded there is no strain on the winding gear proper as the supporting mechanism is self-locking, and the weight of the load tends to keep the doors closed rather



Fig. 1.—The New Steel Quick Dumping Ore Car Built by the Pressed Steel Car Company, Pittsburgh, Pa.

building both the docks and the vessels, which is impracticable, as it would destroy interchangeability. Consequently the general dimensions of the new cars were confined to the same length and nearly the same width and height as the old equipment and these limitations which were imposed upon the builders and designers of all cars for this service has resulted in the building of cars that were not self-clearing and not adapted to rapid unloading.

The question of a reduction in the time and labor required to unload these cars has recently become of more importance for a number of reasons, and the railroad companies have permitted a number of variations from the old standard dimensions, which has resulted in obtaining a more ideal car construction. The Pressed Steel Car Company, Pittsburgh, Pa., has just completed a sample car at its Chicago plant, which is shown in the accompanying illustrations. This car represents a lot of 300 built for the Duluth & Iron Range and the Duluth, Misabe and Northern Railroads, and its construction shows what can be done when the restrictions formerly hampering the builders were removed. Fig. 1 is a general view of the car and Fig. 2 gives two views looking into the interior of the car and showing the doors closed and open. The car is of the single hopper, center dumping type, and in order to make it self-clearing the area of the bot-

tom opening has been made very large, about 50 sq. ft., and the slopes of the hopper sheets have been made very steep, being 50 and 60 degrees from the horizontal at the ends and sides, respectively. This was brought about without materially reducing the carrying capacity of the cars by increasing their height and width, reducing the wheel base of the trucks and spreading them farther apart. The door opening is closed by two doors hinged at the sides, which also form a part of the vertical sides of the car. In this way when the doors are opened part of the sides as well as the bottom falls away from the load and makes a large and unobstructed opening, which, it is said, reduces the chance of bridging to a minimum. The doors meet on the center line of the car, and each is supported by two 6-in. channel bars to which the door-operating gear bars are attached. The gear controlling the movement of the doors is designed to be operated from either side of the car, and is so arranged that when the doors are closed and the car loaded there is no strain on the winding gear proper as the supporting mechanism is self-locking, and the weight of the load tends to keep the doors closed rather than to open them. The movement of the doors is accomplished by cranks which turn over a dead center into a position of rest, and the doors are connected thereto by heavy rods with a screw attachment for adjustment instead of chains. This construction, it is stated, prevents stretching and insures the doors staying tight, thus preventing leakage of ore in transit. Gears of this kind have been used on coal cars, and have given satisfactory service there. They also possess the further advantage that if the doors are frozen and will not drop by gravity they can be forced down by the connecting rods, something which cannot be done where chain connections are employed. A safety device, which is said to be absolutely positive in action, is another feature of the door-opening gear. In operation a wrench is applied to the square end of the operating shaft and the crank arms previously mentioned are revolved by block clutches having a clearance of half a revolution. This permits the crank to revolve for a half revolution, after having been brought over the dead center, which is sufficient to fully open the doors without moving the wrench in the operator's hands. When the doors have been opened these clutches are in the proper position for closing them and there is no lost motion.

The following table gives the general dimensions of the cars:



Length over striking plates, feet and inches.....	22 1
Length inside of body, feet and inches.....	18 13/4
Width over side sheet, feet and inches.....	8 7
Width inside of body, feet and inches.....	8 6 1/2
Height from rail to top of side, feet and inches.....	9 6
Height from rail to center of drawheads, feet and inches.....	2 10 1/2
Length of door openings, feet and inches.....	6 7 1/2
Cubic contents, level, cubic feet.....	686
Weight of cars and trucks, empty, pounds.....	32,700
Rated capacity, pounds.....	100,000
Maximum capacity, pounds.....	120,000

In designing the car all the details were worked out to secure greatest possible maintenance economy. The present practice of loading the cars with steam shovels makes it particularly difficult to keep the doors tight and to prevent leakage of ore, and for that reason the doors have been made stronger and are braced more heavily than has been the practice in the past to prevent distortion during loading. This car was recently tested at the Clinton furnaces, Pittsburgh, Pa., by loading it with 100,300 lb. of wet ore. This entire quantity was unloaded by one man in eight seconds, and the car entirely cleared itself without resorting to pok-



Fig. 2.—Views Into the Car, Showing the Doors Closed and Open.

ing or hammering the sides to loosen the ore. On the completion of this test the car was loaded with 68,000 lb. of steel punchings placed directly over the doors, and no sign of weakness or leakage developed, although this was a very severe test of the gear.

### A Permanent Exhibit of Foundry Equipment

F. N. Perkins, president of the Foundry and Manufacturers' Supply Association, whose members are exhibiting their products at the convention of the American Foundrymen's Association at Detroit this week, has written a letter to the membership on the proposal for a permanent location with suitable buildings for such exhibits. Mr. Perkins, referring to the fact that the association goes from city to city with its annual exhibition, and thus has to use such buildings as are offered without regard to their location, expresses the opinion that a permanent location is feasible, and should be the means of making a large saving to the members. A further suggestion in the letter is that the time has come for the Foundry and Manufacturers' Supply Association to act independent of any association of foundrymen; and if it is decided to continue to go from city to city, as heretofore, that it should make its own arrangements for its exhibits. The point is also made that where a convention league or other commercial organization in a city invites the foundry exhibit and the allied association conventions it goes to the local foundry interests to solicit funds for entertainment and not to the general business interests of the city. The letter expresses the opinion that the friends of the Foundry and Manufacturers' Supply Association should not thus be expected to bear the brunt of entertainment.

### The Philadelphia Foundrymen's Association

The one hundred and ninety-ninth regular meeting of the Philadelphia Foundrymen's Association, the last previous to the usual suspension for the summer months, was held at the Manufacturers' Club on the evening of June 1, with President Thomas Devlin in the chair. The secretary reported at length in reference to the coming convention of the American Foundrymen's Association, to be held in Detroit June 6 to 10. Quite a large delegation of foundrymen from Philadelphia and vicinity has arranged to attend. Two new members were elected, Smith, Rudy & Co., foundry specialists, 411 Walnut street, Philadelphia, represented by W. D. Rudy, and Plitt & Co., iron and steel merchants, 1543 Real Estate Trust Building, represented by H. M. Plitt.

It was decided that the association would mark its two hundredth regular meeting by giving one of its highly appreciated foundrymen's dinners, probably on October 5, with the New England, Pittsburgh, and

Newark foundrymen's associations as its special guests.

A committee, consisting of Dr. E. E. Brown, chairman; Howard Evans, J. Howard Scheeler, H. L. Haldeman, August A. Miller, Walter S. Bickley, Josiah Thompson, George C. Davies and Walter T. MacDonald, was appointed to make the necessary arrangements.

Dr. Elmer E. Brown of E. E. Brown & Co. presented an interesting paper on "The Cost of Living," in which he discussed the various causes of prevailing high prices. He concluded:

The remedy is simple, but will not be adopted: First, stop further immigration; second, adopt a system that will give us an education-democracy instead of an education-aristocracy. Establish practical agricultural schools all over the country, and popularize that form of education—not pauperize it. Build fewer high schools and more common schools; make every schoolhouse a place for the meeting and discussion of public questions and give citizens of all ages an opportunity of acquiring an education sufficient to fit them for American citizenship. Give less time to psychology and more to domestic economy; make farming fashionable, and make it the high ambition of every man to raise a bigger crop of foodstuffs than his neighbor.

Following adjournment there was a meeting of the foundry proprietors and managers, who discussed behind closed doors the foundry labor situation in Philadelphia, particularly the demands for increased wages by the molders, but no definite action was taken. After the meeting the usual luncheon was served in the club dining room.

The Vaughan & Bushnell Mfg. Company, Chicago, maker of heavy hardware specialties, is increasing the capacity of its plant and has recently placed an order with the Allis-Chalmers Company for a 16 x 36 in. heavy duty Corliss engine. This will be fitted with a rope flywheel for driving the shafting in the shop.

# The Hardness of Steel

It Is Both Static and Dynamic—The Brinell and Shore Tests Differentiated

BY GEORGE AUCHY.

What is hardness? The iron trade gives a number of answers to this question without realizing apparently that they are contradictory and conflicting. It says that hardness is: (1) Resistance to a file. (2) Resistance to a hardened steel ball steadily pressed in (the Brinell test). (3) Resistance to a tiny pointed falling tup (the Shore scleroscope). The hardness measured in these different ways is everywhere assumed to be the same hardness, and nowhere, it seems, is there any suspicion that there are two entirely distinct and widely different forms of hardness, just as there are two distinct and widely different forms of strength; and as these different forms of strength have been designated static and dynamic (resistance to steady stress and to shock), so also the two forms of hardness may be designated static hardness and dynamic hardness. But, as we have said, taken as a whole the iron trade does not seem to be aware of this difference in hardness, and Mr. Shore, in giving his wonderful instrument to the trade, shows no appreciation of the fact that it is the ideal method of testing a particular form of hardness. To him, as to the rest of the trade, hardness is hardness, and the obvious discrepancies between the findings of his machine and those of the Brinell, he explains by the fact that in the latter the hardness of different steels is not absolute, but varies with the pressure; that is, a steel which shows twice the hardness of another at a light pressure, might show hundreds of times the hardness at a greater pressure. The deeper the ball sinks the greater the resistance to its further descent becomes, and this resistance increases at a faster rate in hard than in mild steels.

## Discrepancies of Ball and Scleroscope Tests

But, though it is true that, taken as a whole, the iron trade manifests no perception of the fact that there is static hardness and dynamic hardness, and that there is a vast difference between the two, it is also true that the writer is not the first by any means to point this fact out. Thus, for instance, in 1894, Professor Arnold drew a distinction between "brittle hardness" and "abrasive hardness," but only briefly and incidentally. Again, in the *Journal of the Iron and Steel Institute* for 1909, Vol. I., Professor Turner of Birmingham, England, very clearly and definitely states the difference as follows: "The usual quantitative tests for hardness are static in character, but the conditions are profoundly modified when the penetrating body is moving with greater or less velocity . . . what might perhaps for purposes of distinction be called dynamic hardness." Although here Professor Turner so clearly distinguishes dynamic hardness from static, yet the fact that he does not really appreciate and fully realize this difference is indicated later in the same article by his statement that the Shore scleroscope and the Brinell ball test "measure one and the same physical property." True, his table of results confirms this statement, but how he obtained such results is a mystery. Further indication is the fact that the many and striking discrepancies of the Shore scleroscope, which he also then quotes, he is quite at a loss to account for, and resignedly gives it up with the remark that "further information is yet needed as to the exact property which is measured by this form of test."

The real fact is that there is nothing strange or puzzling in these discrepancies, and no further informa-

tion is needed as to the exact property which is measured by the Shore scleroscope; that property is obvious. What is strange and mysterious is his table of agreements with the Brinell test. The writer got entirely different results in one particular. Instead of agreement, the Shore test showed a hardened, untempered, 1.25 carbon file bar to be  $3\frac{1}{2}$  times as hard as a 0.10 carbon rolled bar, while the Brinell test showed it 900 times as hard. These results are calculated to make one's head swim if previously possessed with the idea that the tests "measure the same physical property." If Professor Turner is right in his opinion that static hardness is one thing and dynamic hardness quite a different thing, then his later assertion that the Shore scleroscope and the Brinell test measure the same physical property is as obviously wrong as an assertion that the falling tup and the tensile machine measure the same property, and the results he quotes must be confirmatory of his assertion either by accident only or by mistake. His table of agreements is, as we have said, a strange and puzzling thing. On the other hand, discrepancies which he wonders at, it seems to us, are not discrepancies at all. That india rubber gives a rebound equal to that of mild steel does not seem at all mysterious or marvelous. It is merely a plain expression of a simple fact, the fact that dynamically—to shock—india rubber is as hard as mild steel. Statically—to steady pressure—it is a vastly different story. Neither is it strange that light pine wood gives a rebound double that of heavy cast iron. It would be strange if a static hardness test showed that, to be sure. Nor is it at all "curious" that hard wood like teak gives a rebound of only one-fourth of what the light pine wood gives. It is only an evidence of the brittleness of the former. Again, just as we are not transfixed with astonishment when we see a mild steel stronger to shock than a harder one, so we have no occasion for wonderment when we find that copper is 30 Shore and brass only 17, and yet the brass scratches the copper and not *vice-versa*.

## Pure Hardness and Hardness Complicated by Brittleness

Finally, it is not inexplicable that hard-rolled copper is dynamically harder than mild steel, although the steel cuts the copper and the copper not the steel. It is entirely natural and shows simply that the steel is brittle. With regard to Maurer's point that by 300 degrees tempering a hardened steel lost according to the Shore test only 11 per cent. of its hardness, and according to the Brinell test 38 per cent., the explanation is perhaps very simple and obvious. It is that in the one case the hardness measured in pure hardness while in the other it is hardness complicated by brittleness. The Shore test measures brittleness as well as hardness, and the brittler the steel the greater proportionately the depth of penetration of the falling hammer and the less consequently the rebound. In this test the brittleness therefore counteracts the hardness and lowers the hardness result, and if, as is probably the case, going from the softest up through the hardest steels, there comes a point in the series up near the top where brittleness increases faster than hardness, then plainly the Shore test at that point becomes more and more of a shock test and less and less of a hardness test, until finally it ceases entirely to be a hardness test and places different steels not in the order of their hardness but of their brittleness. That is to say, it



makes the harder steel appear the softer and vice-versa. The explanation, then, of Maurer's fact that steel tempered at 300 degrees C. lost according to the Shore test only 11 per cent. of its hardness instead of the 38 per cent. really lost, is that right here is the point where brittleness begins to overtake hardness and where therefore the Shore instrument begins to register brittleness instead of hardness. It is the writer's experience that if a piece of steel is harder by Brinell at one spot than at another, then it is almost invariably softer by Shore. Frequently a saw will show harder statically inside than at surface (through higher carbon, milder tempering, or both. Invariably in such cases it shows softer dynamically; that is, to the Shore test. Shore himself has found (although he does not appear to realize the significance of his discovery) that in testing untempered high carbon steels by his instrument the higher the heat for hardening—that is, the harder and brittler the steel—the softer it shows to the scleroscope.

#### The Scleroscope Invaluable for Shock Test

But although as a hardness test for high carbon tool steels the scleroscope is an obvious failure, as a shock test used in connection with the Brinell test it would seem to be invaluable. For the dynamic hardness in proportion to the static indicates whether or not the steel has been overheated for hardening; that is, if one finished tool shows the dynamic hardness to be 20 per cent. of the static (taking a very mild steel as a standard and calling both Brinell result and Shore result on it 1, and expressing the hardness of all other steels by the proper multiple in each case), and another shows it only 10 per cent., the latter has been quenched at a higher temperature than the former. As a test of the heat of hardening, this is simpler and easier than Heyn and Bauer's elegant solubility and etching test combined with hardness test (*Journal Iron and Steel Institute*, 1909, Vol. I) and perhaps as sure and effective.

In using the Brinell test it is well to bear in mind the fact pointed out by Shore that the hardness it indicates is not absolute and true; that is, that although all steels from the softest to the hardest are placed in their proper order with regard to hardness, yet the ratio of hardness of each steel in the series to its predecessor is exaggerated and multiplied, and the more so the harder the steel. But this exaggeration of ratio does not seem to be an important matter, and does not spoil the usefulness of the Brinell test. That a steel is placed in its proper position in the scale of hardness is the main thing; and that it is not nearly as much harder as any one of its predecessors, and not nearly as much softer as any one of its successors, as the Brinell figures indicate, is for practical purposes not a serious matter. But if absolute hardness figures are desired, it would seem that elastic limits supply them. That is, static hardness is elastic limit, and *vice versa*. Or, the pounds pressure per square inch necessary to effect a permanent bend, with supports distanced in proportion to thickness of sample, would seem to express very well the absolute hardness, although such results and elastic limit figures, of course, would not be comparable.

#### The Measure of Hardness in Service

Another point in connection with the Brinell test that must be kept in mind is that this test shows merely the degree of tempering and does not correspond to the hardness of the tool in use; for the latter is not purely static but is a compound of static and dynamic. Probably a file in the hands of a practical man accurately expresses this quality of hardness in practical use, but of course cannot distinguish any but wide differences in hardness. In a single test what scientific instrument then does tell how a tool may be expected to do its duty in actual service? Obviously not the Ballentine, the principle of which is the same as that of the Shore, except that the degree of deformation of the sample by

the falling body is measured instead of the rebound. Perhaps the Jaggar, which is a rapidly revolving diamond drill, or the Keep, which is a standard steel drill. But the Martens, in which the width of a scratch produced by a definitely weighted diamond, or the Turner, in which weights are added until a scratch is produced, would either one seem to correspond best in principle to that time-honored test, the file in the hands of a practical man.

### The Gary Screw & Bolt Company

Pittsburgh parties who own and operate the Pittsburgh Screw & Bolt Company, Pittsburgh, Pa., have purchased from the Gary Land Company, Gary, Ind., a factory site containing 20 acres, located east of the Land Company's first subdivision, lying between the Gary & Western Railway to the west, the Wabash Railroad to the south and the Chicago, Lake Shore & South Bend Electric Railway to the north. The plant site will be reached also by the Elgin, Joliet & Eastern Railway, thus giving railroad connection with all of the main trunk lines serving Gary. The purchasers propose at an early date to begin the building of a large factory, equipped with the most modern machinery throughout, for the manufacture of bolts, screws, nuts and rivets.

A company will be incorporated under the name of the Gary Screw & Bolt Company, with officers as follows: J. R. McGinley, chairman of the Board of Directors; W. G. Costin, president; W. F. McKenzie, vice-president; John A. Collins, general superintendent. They are men of large means, widely experienced in manufacturing enterprises of various kinds, of which the Pittsburgh Screw & Bolt Company is one of the most successful. Their experiences in the bolt, screw, nut and rivet business enables them to appreciate the advantages offered by Gary as a site for the manufacture and distribution of these finished products. The demand for these products has grown to large proportions in the West, and the building of this modern plant at Gary, close to the merchant bar mills of the Indiana Steel Company, from which the bolt company will draw its large requirements of raw materials, is a step which takes advantage of the opportunity at Gary to provide the best of facilities for meeting this demand.

The plant site is large enough to provide for the future growth of the business. Great care has been exercised in selecting the site to obtain the best of railroad facilities, both with reference to receiving raw materials and shipment of the finished products. When completed and in operation the plant will give employment to several hundred skilled workmen.

The Gary Land Company is to extend Fifth avenue eastward parallel and adjacent to the right of way of the Chicago, Lake Shore & South Bend Electric Railway Company, through the plant site of the bolt company, continuing it eastward until it joins with the gravel roadway leading to the town of Millers. A number of residences will be required to be built in the eastern part of the Gary Land Company's first subdivision, to furnish homes for the employees of the bolt company. The new company expects to begin building operations at an early date.

The Wilder Metal Coating & Mfg. Company, Connelville, Pa., recently installed a new hand dipping tank, which has a capacity of coating about 20 tons of sheets per day with aluminum. The company is filling an order for 200 squares of corrugated aluminum roofing sheets for a contractor who in the last three months has specified and used 500 squares of this material on various buildings. The company also reports a steady increase in aluminum coated sheets for oven linings, furnace jackets, &c.

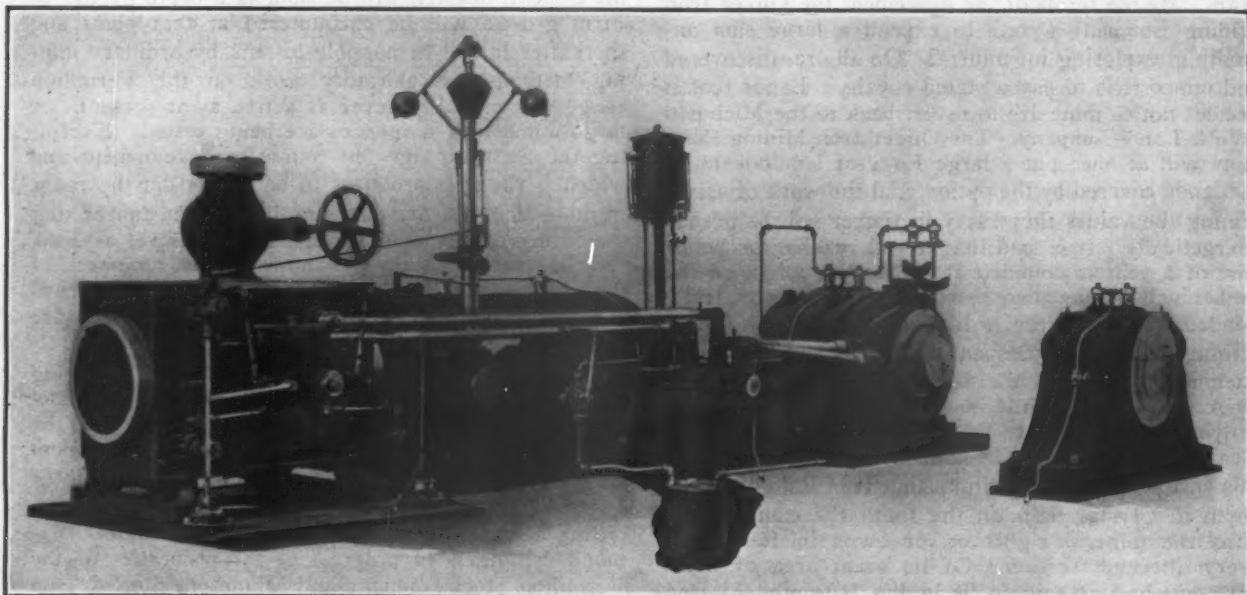
## The Peterson Individual Oiling System

Good lubrication plays an important part in the operation of any engine or machine, and the desirability of a continuous oiling system which automatically supplies a liberal stream of oil to all the bearing surfaces has been proved by experience. Without one of these systems there is a constant loss of oil, power is wasted in overcoming friction and labor is required to keep the oil cups filled. The Peterson Engineering Company, 50 Church street, New York City, has developed an individual automatic oiling system, which supplies a clean, cool stream of oil to each point to be lubricated without any waste, for the used oil is returned to the filter where it is thoroughly purified before being used over again.

The system, which in the accompanying illustration is shown applied to a 500-hp. Corliss engine, consists of a small receiving tank, a filter, an oil pump, and sight oil feeds, together with the necessary pipe and fittings. The receiving tank is located at a convenient point, and all the oil will flow to it by gravity. The

and the oil passed on through one to another in the body of the feed may be used as an elbow with the lubricant flowing in at one side and out to the right or left to another feed as is most convenient.

Drawn steel pipe and patented "Union-Cinch" elbows and tees and a controlling valve are furnished for making the connections between the filter, receiving tank, pump, and oil feeds, so that the entire system can be put on an engine without any pipe threading whatever, and as every fitting is a union it is a simple matter to disconnect the system for shipping and quickly set it up again when the engine is in place. The joint between the pipe and the fitting is made by inserting the pipe in the fitting and setting up the nut which compresses a metal ring around the pipe, thus making a pressure tight joint, which, it is said, will not shake loose. This tubing is fully annealed, so that it may be easily bent to conform to the shape of the engine or machine frame where it is to be installed. Another advantage of this system is that where the engines are already in operation it can be easily installed by an ordinary mechanic in a few hours because



A 500-Hp. Corliss Engine Equipped with the Individual Oiling System of the Peterson Engineering Company, New York City.

heavy particles of foreign matter and the entrained water are automatically separated from the oil in this tank, after which the lubricant is pumped to the filter for final purification, and then flows to the various oil feeds by gravity.

The filter is cylindrical in form, and is divided into two compartments with a removable cover. The bottom is provided with a 2-in. standard pipe flange, which supports the filter on the engine frame at an elevation of about 6 in. above the highest point to be lubricated. The oil from the receiving tank enters the first compartment at the bottom, and is carried to the top of the filter in a pipe. From this point it discharges into a removable screen, and passes down through a tube perforated at its lower end from where it percolates up through water gradually rising to the top where it overflows to the filtering chamber, whence it emerges thoroughly purified for use a second time and flows into the clean oil storage compartment. Gauges are provided for indicating the height of the oil and water in the filter, and each compartment is supplied with a faucet for drawing off the filtered oil or the accumulated water.

The oil pump is of the plunger, rotary or semi-rotary type, and is connected to the engine either through a belt or directly, as is most convenient. Sight oil feeds are located at each point to be lubricated. These feeds are provided with from one to four connections, so that they may be either piped up in a row

of its simplicity and the small amount of labor required to erect it.

### The Standard Gauge Steel Company Extending.

The Standard Gauge Steel Company, Beaver Falls, Pa., has contracted with the Nicola Building Company, Pittsburgh, for a large addition to its machine shop. The building will be of steel and concrete construction, 80 x 630 ft., two stories. The steel will be furnished and erected by the Penn Bridge Company, Beaver Falls, Pa., while the concrete work will be done by the Nicola Company. The building will be designed for carrying two light cranes with 70-ft. spans and will be completed about October 1. This addition will permit of the present machinery being rearranged for continuous operation, and some new machine tools will likely be required.

The monthly meeting of the Mechanical Section of the Engineers' Society of Western Pennsylvania was held in the society rooms, Oliver Building, Pittsburgh, on the evening of June 7. A paper entitled "Air Conditioning Apparatus" was presented by W. H. Carrier. The various types of apparatus in use for purifying and washing air were described, together with features to be observed in the installation of such apparatus. A. R. Ramer, assistant chief engineer of the Pittsburgh & Lake Erie Railroad, and William G. Boyle, consulting engineer, took part in the discussion.



## Options on Vast Iron Ore Tracts

### The Steel Corporation Closes with the Michigan Iron & Land Company

MARQUETTE, MICH., June 4, 1910.—The deal by which the Oliver Iron Mining Company, the subsidiary of the United States Steel Corporation, has taken options on the great holdings of the Michigan Iron & Land Company is one of the most important transactions of the kind negotiated in many years. There are two options, one covering the standing timber and the other the mineral rights. The option on the timber covers 313,600 acres and provides for a sale price of large proportions if the timber is found to run up to the estimates. The option on the mineral rights covers, in addition to more than 300,000 acres of land which the Michigan Iron & Land Company holds in fee simple, 111,640 acres on which the company holds the mineral rights, having disposed of the timber.

The option on the mineral rights runs a term of years. By the terms of the agreement the Oliver Iron Mining Company agrees to expend a large sum annually in exploring for mineral. On all ores discovered and mined it is to pay a stated royalty. Lands that it decides not to mine are to revert back to the Michigan Iron & Land Company. The Oliver Iron Mining Company will at once put a large force of landlookers on the lands covered by the option, and the work of ascertaining the values they carry in timber will be pushed energetically. It is said that it will require the better part of a year to complete it. That the option on the timber will be executed there is said to be practically no doubt. Also there is little doubt that the Oliver Mining Company will open permanent and large producing mines on the Michigan Company's land.

A map on which the Michigan Iron & Land Company's acreage between Marquette and Sidsaw is indicated resembles a mammoth checker board, for in this entire stretch of territory and from Baraga on the north to Crystal Falls on the south the company retains the mineral rights on or owns in fee simple every alternate section. Of its great area of lands fully one-half is said to be in the Huronian or iron bearing formation, and a considerable acreage is of known mineral value. Very little exploratory work and no deep diamond drilling at all have been done, however.

The closing of the options with the Oliver Iron Mining Company will greatly stimulate activity in exploration. The work of the corporation on the optioned lands will be attentively watched and lands adjoining promising explorations should be in demand. The Michigan Iron & Land Company, of which J. M. Longyear of Marquette is the present chairman, is an English corporation, though its directorate is American. The lands in its control were part of the acreage granted by the federal Government to the State in 1856 for the purpose of encouraging railroad building.

#### The Hill Mine Promises Large Shipments

Cleared of its timber scarcely two years ago, the United States Steel Corporation's Hill mine at Marble has entered the list of producers. It is shipping only from its underground workings at present, but it will be sending out ore from its open pit shortly. Probably 500,000 tons will be forwarded this season. The mine is opened on the so-called Hill lands of the western Mesaba range, but it differs from the other newly developed Steel Corporation properties of that particular district in that none of its ore requires washing, but may be shipped as it lies in the ground. The Hill will be one of the giants of the Lake Superior iron region. It has a mammoth ore body, from which a very large amount of overburden already has been

stripped. The great bulk of the mining will be done by steam shovel. The ore will be handled by the Great Northern Railroad.

One of a number of other mines that the Steel Corporation is opening is the Leonidas in the Eveleth district of the Mesaba. This property will be an underground producer and it will be a large one. The shaft, which already is down 200 ft., will be one of the very deepest on the range. It will be lined with steel from top to bottom. The Leonidas will join the ranks of the shippers next year.

#### More Concrete Shafts

The work of constructing a concrete shaft at the Armour mine at Crosby, on the Cuyuna range, has been started. It is being done by the Foundation Company of New York, which already has done considerable work of this kind in the Lake Superior region, and lately has begun building a concrete shaft on the Vermilion range for the North American Mining Company. The Armour is a property of the Rogers-Brown Ore Company and is in section 11, 46-29. The concrete shaft at the North American tract, which is in the Soudan district, will be sunk to a depth of 100 ft. Firm ground will be encountered at that point and thereafter it will be possible to sink by ordinary mining methods. Exploratory work on the Vermilion range was probably never as active as at present. A large number of properties are being tested. Excepting the St. Clair, now in course of development and which is the first producer to be opened on the range in more than a score of years, it does not appear that the future of any of the various tracts is yet assured. Ore has been encountered, however, at a number of different points, and as far as quality is concerned there can be no complaint. Whether the deposits are of sufficient extent is the question.

The Duluth-Vermilion Iron Company is exploring in the Robinson Lake basin. The Vermilion Iron Development Company is sinking a shaft, and so are the Rice Bay Iron Company and the Roy Development Company, the latter having a mixed ore at a depth of 120 ft. Welch & McGreevy of Minneapolis are test-pitting a tract adjoining the old Chandler mine. Diamond drilling is in progress at the properties of the Vermilion Steel Company and Minnesota Steel & Iron Company. The Section 30 Development Company is exploring property adjoining the St. Clair mine. Shaft sinking is under way and some very good ore has been found. The Cannon Mining Company has partly tested the Nordstrom property in section 2, 61-15, with a shallow shaft and now has a diamond drill at work there.

#### New Railroad Extension to Menominee Mines

The Chicago, Milwaukee & St. Paul Railroad, which during the past few years has gradually been reaching out for traffic from the iron mines of the Menominee iron range, is planning a new extension of its lines in that region. It proposes to enter the Iron River and Stambaugh district. This territory, at the western end of the range, has become one of the most important fields of the Menominee and it is still in the early days of its development. The ore deposits are proving much more extensive than imagined a few years ago. The Buffalo & Susquehanna Company's Chicago property has been found worthy of extensive development since the original railroad route was staked out, and the iron formation on which it lies has been more fully traced. For this reason the railroad will be built to the north of Chicago Lake, instead of to the south of it. The proposed line will be not far from 20 miles in length. It will traverse large areas of hardwood lands.

The Parkersburg Iron & Steel Company, Parkersburg, W. Va., closed down its rolling mills last week for repairs, which will require about three weeks.

## The Improved Barrett Geared Ratchet Jack

After a series of actual service tests for nearly two years, the Duff Mfg. Company, Pittsburgh, Pa., has placed on the market an improved geared ratchet jack having a lifting capacity of 40 tons. This jack, which is known as the Barrett No. 400 jack, is designed particularly for the rapid, safe and convenient handling of heavily loaded freight cars, passenger or Pullman coaches and locomotives. It represents the latest developments in geared ratchet jack construction and is fully capable of taking care of any kind of railroad equipment under all conditions. The working mechanism of the jack, it is said, is very different from that of any other geared jack, and in designing it the maker had ease of operation and good wearing qualities in mind. The jack is single acting and very quick in action, raising the load rapidly and, it is said, with



The No. 400 Barrett Geared Ratchet Jack, Made by the Duff Mfg. Company, Pittsburgh, Pa.

much less energy at the end of the lever than in any other model.

The jack consists of a strongly ribbed base in which the lifting bar slides. This bar is raised by a hardened steel pinion turning on its own bearings or trunnions in bronzed bushings and not on a steel pin. A large steel gear wheel is secured on the hub of this pinion and is revolved by a small hardened steel pinion which meshes with it. Special crucible machinery steel is used for making this small pinion, which revolves on its own bronzed bushed bearings and has a suitable ratchet mechanism for turning it secured to its hub. A pawl in the socket lever turns this ratchet and a retaining pawl is also provided. As there is no movement of the lifting pawl in the lever socket all wear is eliminated at that point, which is an important feature, as it is stated that all the other types of geared jacks wear considerably where the pawl is pivoted in the lever socket.

When the load is being raised all the lowering mechanism is thrown entirely out of service and is in no way brought into action while the load is going up. While the load is being lowered this mechanism, which is automatic and simple, is thrown into play by a reversing lever conveniently placed on the front of the jack. This lever is so arranged that its position indi-

cates whether the jack is being used for raising or lowering loads. This construction is of a decided advantage, as no superfluous parts are being jolted around while the jack is being operated and only those pertaining to the movement of the load in the desired direction are in service when the weight is being raised or lowered. The only wearing surfaces in this jack turn in bronzed bearings, which are easily accessible and can be renewed if necessary. A special bronze plate is placed back of the lifting bar or rack and adjustments can be made for any wear which might occur, thus keeping the rack and the large pinion in the proper mesh at all times.

This jack raises a load of 40 tons to a maximum height of 17 in. and weighs only 275 lb. Because of its light weight it is possible to transport the jack easily from place to place and it is convenient to handle and also to operate. The bar is  $2\frac{1}{2}$  x 3 in. in cross section and the height of the jack with the bar down is 28 in. Fairbanks Morse & Co., Chicago, Ill., representing the maker's railroad department, are distributing the jack.

## A New Ball Industry

The newly organized Grant & Wood Mfg. Company of Detroit and Chelsea, Mich., announces that in addition to its extensive operations in the manufacture of automatic multiple spindle screw machines and screw machine products, it will also engage in the manufacture of high-grade balls for bearings. John J. Grant, consulting engineer for the company, has long been called the father of the ball industry. Every machine used in the manufacture of balls for bearings was invented by him, even the German and French balls being made on machines patented and sold to the Europeans by Mr. Grant.

The use of Mr. Grant's machines has heretofore reached the highest developments abroad and the best bearings produced by American manufacturers have, therefore, necessarily been equipped with imported balls. He has recently perfected important improvements in his machines and processes, however, which admit of the production of a higher grade of ball for bearing purposes than has heretofore been possible. The Grant & Wood Mfg. Company has acquired all rights and patents, both American and foreign, on Mr. Grant's machines and processes, and is equipping its Chelsea plant for the extensive production of a superior quality of balls. The new machines are now being built and the company expects to have its product on the market sometime during the coming season.

The Grant & Wood Mfg. Company recently purchased outright and consolidated the properties of the Grant Automatic Machine Company, Cleveland, Ohio, and the Chelsea Stove & Mfg. Company, Chelsea, Mich. The plant of the latter company, which is a very large and modern one, is now being extensively equipped with all new machinery. The officers of the company are as follows: President and general sales manager, Eben B. Boye, formerly manager of the Warner & Swasey Company, Cleveland, Ohio; vice-president, Arthur O. Smith, president of the A. O. Smith Company, Milwaukee, Wis.; secretary and treasurer, Harry L. Stanton, formerly manager of the Chelsea Stove & Mfg. Company, Chelsea, Mich.; factory manager, Erwin E. Wood, formerly president and general manager of the Walcott & Wood Machine Tool Company, Jackson, Mich. The directors are: Dr. J. B. Book, a Detroit capitalist; John T. Shaw, president of the First National Bank; William T. Barbour, president of the Detroit Stove Works; Walter E. Flanders, president of the E-M-F Company, and Robert M. Brownson, attorney.

The Dawson Construction Company, May Building, Pittsburgh, Pa., has been awarded a contract for the erection of a power house at Woodville, Pa., for the Allegheny County Home.



## New Tools and Appliances

**Pin Vise for Toolmakers.**—A handy toolmakers' pin vise has been put on the market by A. S. Koch & Sons, 143 Nevin street, Lancaster, Pa., which is readily opened or closed with one hand while the other holds the work in place in the jaws. The jaws are pivoted and their tails engage a sleeve sliding on the hollow handle of the vise. In operation this sleeve is drawn away from the jaws which are opened by a spring and the work inserted between them.

**A New Model of Air Compressor.**—A line of air compressors built in eight sizes and ranging in capacity from  $6\frac{1}{2}$  to 140 cu. ft. of free air per minute, has been brought out by George S. Comstock, Mechanicsburg, Pa. The compressors are built with one, two and four cylinders and the drive is by a crank running in an oil bath and a modified Scotch yoke acting as a universal joint and insuring equal distribution of the pressure. One of the advantages claimed for this type of drive is that the parts may wear and get out of alignment without seriously affecting the operation of the machine. The main frame is a single casting provided with large water jackets for the cylinders and the valves, and the cover may be readily lifted off for inspecting the working parts.

**A Watering Machine for Coke Ovens.**—An automatic watering machine designed particularly for use in connection with the rectangular type of coke oven has been brought out by Affelder & Gorton, Brownfield, Pa. The serious drawback in operating the rectangular oven has been the fact that watering the coke required twice as many men as pushing out the coke, loading it into cars and recharging and leveling the oven combined. Aside from this fact, hand watering was also unsatisfactory and detrimental to the coke because of the irregular distribution of the large amount of water used and the damage to the oven by the water coming in contact with the lining brick and lower courses of the crown. This new machine consists of a cylinder mounted on a truck which runs upon the same track as the other machines and is propelled from oven to oven by a hand-operated sprocket drive. The cylinder piston is fitted with a hollow rod extending through the front head and automatic valves are arranged so that the piston rods and the two upper supporting pipes travel inward as far as the center of the oven and back again distributing water uniformly over the coke bed through two perforated heads. It is said that with this machine it is possible to accomplish in 4 to 6 minutes what formerly took two men from 20 to 30 minutes to perform by hand.

**A Drill for Rapid Tapping.**—W. F. & John Barnes Company, Rockford, Ill., has designed a 15-in. drill for rapid tapping. To make the control of the reverse very convenient the lever is brought down so that the hand controlling the movement of the hand wheel can reverse the spindle quickly by touching it with the thumb. If it is desired to have a greater leverage than the hand wheel affords, a rod or lever can be placed in the rim of the wheel which is drilled for this purpose. The reversal of the spindle is secured by a clutch controlled by the short arm of the reversing lever and by pulling out a slip gear at the back of this shaft the tapping lever can be used to start and stop the drill. This arrangement is more convenient in some cases than shifting the belt when it is desired to use the tapper.

**A Thread Snap Gauge.**—K. L. Herrmann, Detroit, Mich., is manufacturing a snap gauge designed for the rapid inspection of threaded work which is especially applicable to work of large diameter and fine pitches commonly met with in the building of automobiles. The gauge consists of two hardened and lapped jaws fastened to a C-frame and can be readily applied to the thread at any point without screwing on.

**A New Crucible Furnace and Oil Burner.**—The Anthony Company, 45 West Thirty-fourth street, New York, has designed a furnace for melting metals in a crucible and also a special burner using crude oil as fuel. The flow of oil to the spindle is regulated by the oil valve and it passes through a very small hole in the plug at the

end of the spindle. The oil is then caught up by a current of air completely surrounding this plug and caused to enter the furnace in a finely divided spray. Practically perfect combustion is secured with a pressure of from  $2\frac{1}{2}$  to 3 oz., and it will heat the furnace to about 2,650 degrees F., the melting point of nickel. The walls of the furnace are lined with  $\frac{1}{4}$  in. of asbestos and firebrick placed on the inside. A circular firebrick stand for the crucible is also provided.

**High Speed Planer.**—A. M. Powell of the Powell Tool Company, Fitchburg, Mass., has developed a new type of metal planer which is in successful operation and will be placed on the market as soon as foreign patents have been issued. The type will bear the trade name of the "Hy-Speed-Cut." Its characteristic feature will be a two-speed mechanism which will operate during the cut for the special purpose of planing work having high and low spots. During the cut the planer runs at the regular speeds employed in the accelerating speed type of its builder. On low spots, that is to say, when not cutting, the speed is highly accelerated. Thus, with a casting having openings in its surface the planer runs alternately slow and fast, the changes being determined by the position of dogs on the bed. The machine can be used as an ordinary type planer by throwing down a shifting dog.

**An Improved Drill Socket.**—A new device in the shape of a drill socket, designed to overcome the trouble caused by broken tangs, has been placed on the market by the Sager Drill Socket Company, West Albany, N. Y. The socket fits into the drill spindle and a split taper sleeve screws into the lower end of the socket. The inside of this sleeve is tapered for taper shank drills. No set screw, wrench or separate collar is required with this socket and no keyways or slots need be cut in the shank of the drill. One of the advantages claimed for this socket is that the operation of drilling causes the taper sleeve to be screwed tighter into the socket and thus grip the drill more positively.

**The Illinois Malleable Iron Company's Expansion.**—The recent purchase by the Illinois Malleable Iron Company, Chicago, of 5 acres north of Diversey boulevard and east of the Chicago & Northwestern tracks, makes its total holdings in this location 25 acres. The company now has under construction a six-story and basement foundry, 80 x 130 ft., which has reached the fourth story, which will be used for gray iron castings and pattern works. The manufacture of brake shoes has recently been taken up and this department will be increased from time to time as business demands.

The Cincinnati Planer Company, Cincinnati, Ohio, having completed its removal into new buildings at the suburb of Oakley, has found it necessary, owing to its greatly increased capacity, to make several changes and promotions in its organization, and in the future the company will be officered as follows: C. H. M. Atkins, president; B. B. Quillen, secretary and treasurer; George D. Walker, assistant secretary and treasurer; George Langen, works manager; Frank Gebhart, superintendent; Percival Reston, chief draftsman; Charles Meiers, sales engineer.

The Pittsburgh Steel Foundry, House Building, Pittsburgh, has arranged for the installation of a crane runway equipped with an electric traveling crane and a 5-ton lifting magnet in the yards at its plant at Glassport, Pa. The new equipment will largely increase facilities for loading and unloading cars.

The Canadian-American Gas & Gasoline Engine Company, Ltd., Dunnville, Ont., recently incorporated, has erected a machine shop, 50 x 200 ft.; molding shop, 60 x 156 ft., and a blacksmith shop, 60 x 75 ft. The company has purchased most of its equipment and expects to be in operation about the middle of June.

## The Columbia Steel Company

### A Promising California Enterprise

The Columbia Steel Company, 503 Market street, San Francisco, Cal., is building a steel casting plant at Black Diamond, Cal., on an arm of San Francisco Bay, which will be considerably more extensive than the

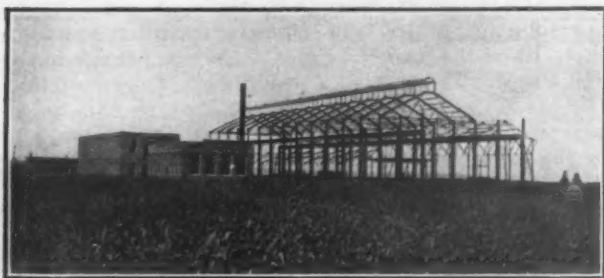


Fig. 1.



Fig. 2.



Fig. 3.

The Columbia Steel Company's New Plant at Black Diamond, Cal.

preliminary announcement regarding the company indicated. In view of the location of this establishment, on the Pacific Coast, illustrations are herewith given which are somewhat of a departure from the ordinary presentation of such matters in *The Iron Age*, but under the circumstances seem justifiable.

Fig. 1, which is a reproduction of a photograph taken May 14 during construction, shows the size of

the plant now being built. The brick building is a pattern shop, 30 x 50 ft., having a trussed roof. The next building, 50 ft. distant, is the pattern storage building, also built of brick, two stories. Beyond is the office building, also of brick, which is 40 ft. square and contains the offices of the secretary, superintendent and clerical force. The main building, situated 60 ft. beyond, is a steel structure throughout. Its general dimensions are 130 x 260 ft. It has a main bay of 60 ft., which is traversed by three traveling cranes. The entire structure is erected on heavy concrete foundations.

Fig. 2, reproduced from a photograph taken at the same time, shows the foundations of the open hearth furnace. Brick masons are now rapidly pushing the construction of the open hearth furnace, annealing ovens, &c. This work is going on while the construction gang is working on the roof and siding.

The foundry building and equipment are under the personal supervision of S. T. Wellman, chairman of the Board of Directors of the Wellman-Seaver-Morgan Company, Cleveland, Ohio, who is acting as consulting engineer for this new California enterprise. Mr. Wellman is so well known to many of the readers of *The Iron Age* that his photograph, taken on the job, Fig. 3, will undoubtedly be of interest to his numerous friends.

Construction is progressing so rapidly that the Columbia Steel Company feels quite confident that the plant will be in operation this fall, probably not later than September. A spur from the main line of the Atchison, Topeka & Santa Fé runs directly to the water front, where the steel company has a dock of its own. Carload business will, of course, be handled by rail in and out of the plant, and less than carload shipments will be handled to all bay and river points directly by steamer. Thus the company not only has excellent freight facilities, but practically an express service.

### The Improved Keuffel & Esser Duplex Slide Rule

An improved form of patented duplex slide rule has been recently placed on the market by the Keuffel & Esser Company, 127 Fulton street, New York. The most recent improvement is the L-shaped end plate, which enables any desired adjustment of the slide to be secured by loosening a screw which passes through the upper portion of one plate, is threaded into the other and fits an elongated hole in the outer section of the slide rule. Loosening the screws at each end of the rule permits the movement of this outer section either in or out to give any desired friction on the slide without disturbing the longitudinal relation of the scales.

These end plates are so shaped that they have a firm bearing on the body of the rule where they are riveted to its lower section, and thus prevent any longitudinal play, while at the same time the slide may be easily pushed back and forth with the finger in making a setting near the center position.

The duplex slide rule is so named because it is graduated on both faces, thus giving practically two rules in one. It is formed of three parts, the two outside pieces constituting the body of the rule and the other the slide. The slide being the same thickness as the rule the surfaces of both are flush, and all the graduations are on the exterior, where they may be readily seen and utilized by simply turning the rule over.

The front face of the duplex slide rule, Fig. 1, is graduated like the familiar Mannheim rule, with all four scales progressing from left to right, while the reverse face, shown in Fig. 2, has the A and D scales graduated in the customary way, while the B and C scales are inverted and progress from right to left.



The slide in addition to the two inverted scales has the scale of tangents usually found on the back of the slide of an ordinary rule. The indices of the scales on one face are in alignment with those on the other face, and a runner encircling the whole rule enables coinciding points on any scales of either face to be found at once.

The principal advantage of the inverted scales lies in the reduction of the operations required to perform many problems, with a consequent saving in time and

in strength required for heavy duty work. The faces of these pulleys are either flat or crowned, and if an extremely wide one is desired the pulleys are furnished with double arms.

These pulleys are made up of two halves which are identical in all respects. Each half consists of a hub shell, which is a semi-tubular piece of heavy steel the length of the hub, the spiders each of which is composed of three arms radiating from a semi-tubular extension, two hub clamps, two rim segments, and the necessary clamps, rivets and bolts.

The bore of the hub is standard, while the lengths vary. One bushing is furnished with each pulley and extra sizes are carried in stock, so that any of the customary sizes of shafting can be provided with bushings. Pulleys from 15 to 42 in. in diameter are of standard construction, and if the faces are wider than 6 in. the arms are reinforced near the hubs. All pulleys whose diameter is greater than 17 in. and the face wider than 6 in., if the bore is less than 4-7-16 in., are provided with gusset plates between the ends of the spiders and the rim flanges to secure additional strength. For pulleys wider than 8 in. these plates are used, regardless of the diameter of the bore.

The American pulleys are of the parting type, which enables them to be put on a shaft without taking it down. Steel hub clamps of a special type are provided, which grip the shaft with sufficient power to prevent slipping when the maximum load is placed on the belt. Another feature which it is stated increases the tractive power of the belt is the groove in

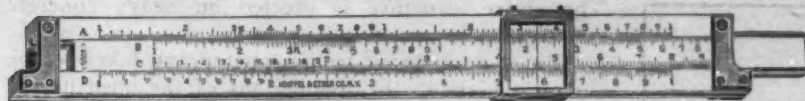


Fig. 1.—Front View of the New Adjustable Duplex Slide Rule, Made by the Kenffel & Esser Company, New York City.

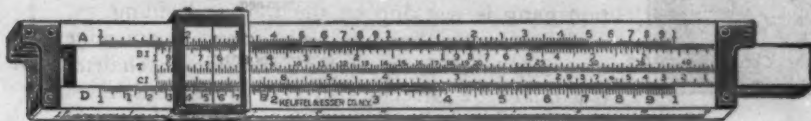


Fig. 2.—Back View of the Rule, Showing the Inverted Scales.

increase in accuracy. This is because when setting to quantities on the inverted scales, the reciprocals of these values, with respect to the regular scales, are given. Thus the operations of multiplication and division are reversed, and what is a dividing operation with the regular scales becomes a multiplying process with the inverted ones. In compound multiplication the solution may be effected in this way by a combination of multiplying and dividing operations, using both sets of scales, with a corresponding reduction in the number of settings. A similar method may be employed in the case of a division where there are a number of factors in the denominator, as the multiplication by a reciprocal has the same effect.

These patented duplex slide rules are made in 5, 8, 10, 16 and 20 in. lengths, with and without trigonometrical scales. The company also makes the No. 4092 Log Log duplex rule, 10 in. long, which, in addition to the scales of the regular duplex slide rule, has a threefold log log scale, graduated from 1.01 to 22,000, with which any root or power of any quantity up to 22,000 may be determined by direct operation at one setting of the slide.

Exponentials generally and many formulæ in electrical and mechanical engineering involving fractional powers or roots, hyperbolic logarithms, &c., are readily handled with the help of this scale. The hyperbolic or natural logarithm of a quantity with its characteristic may be read by the runner without setting the slide, or may be used directly as a factor when required in any formula.

### A Large American All-Wrought Pulley

For a number of years the American Pulley Company, Philadelphia, Pa., has been manufacturing the American all-wrought split steel pulley in sizes ranging from 6 to 42 in. in diameter. Recently, however, larger sizes from 44 to 60 in. in diameter have been added to the line, and the special design shown in the accompanying illustration was followed in their construction. The principal change made was to strengthen the construction to resist the increased strain by adding two arms to the pulley, thus making the number eight instead of six. These arms are bifurcated at the base and the parts lap and are riveted to the vertical flange of an annular hub ring of angle section, the rivets passing through both laps. The hub shell is riveted to the horizontal leg of this same ring, and this type of construction gives the necessary increase



An All-Wrought Steel Pulley Made by the American Pulley Company, Philadelphia, Pa.

the center of the face, which is exclusive in the American pulleys and has been patented by the maker. This groove allows the air to escape from under the belt as pulley revolves, and in this way an increase in the horsepower transmitted by at least a third over that transmitted by a plain face pulley of the same size is secured. Tests made on these pulleys have shown that one 30 in. in diameter and 8 in. across the face will stand a pull of 250 lb. per in. of belt width without slipping on the shaft.

# CURRENT METAL PRICES.

The following quotations are for small lots. Wholesale prices, at which large lots only can be bought are given elsewhere in our weekly market report.

## IRON AND STEEL— Bar Iron from store—

<b>Refined Iron:</b>	
1 to 1½ in. round and square.....	\$ 1.90¢
1½ to 4 in. x ½ to 1 in.....	\$ 2.10¢
1½ to 4 in. x ¼ to 3-16.....	\$ 2.10¢
<b>Rods—½ and 11-16 round and square.....</b>	
<b>Angles:</b>	
3 in. x ¼ in. and larger.....	2.10¢
3 in. x 5-16 in. and ¼ in.....	2.30¢
1½ to 2½ in. x ¼ in.....	2.30¢
1½ to 3½ in. x 3-16 in. and thicker.....	2.10¢
1 to 1½ in. x 3-16 in.....	2.30¢
1 to 1½ in. x ¼ in.....	2.30¢
¾ x ½ in.....	2.40¢
¾ x ¾ in.....	2.50¢
¾ x ¾ in.....	2.55¢
¾ x ¾ in.....	2.60¢
<b>Tees:</b>	
1 in.....	2.65¢
1½ in.....	2.65¢
1½ to 2½ in. x ¼ in.....	2.15¢
1½ to 2½ in. x 5-16 in.....	2.35¢
3 in. and larger.....	2.15¢
<b>Beams.....</b>	
Channels, 3 in. and larger.....	2.10¢
Bands—1½ to 6 x 3-16 to No. 8.....	2.35¢
"Burden's Best" Iron, base price.....	2.15¢
Burden's "H. B. & S." Iron, base price.....	2.95¢
Norway Bars.....	3.00¢

## Merchant Steel from Store—

Bessemer Machinery.....	per lb 1.90¢
Toe Calk, Tire and Sleigh Shoes.....	2.50¢@3.00¢
Best Cast Steel, base price in small lots.....	7¢

## Sheets from Store—

<b>Black</b>	
One Pass, C.B.	R. G.
Soft Steel.	Cleaned.
No. 16.....	\$ 2.90¢
Nos. 18 to 24.....	\$ 2.95¢
Nos. 22 and 24.....	\$ 3.05¢
No. 26.....	\$ 3.10¢
No. 28.....	\$ 3.20¢

## Russia, Planished, &c.

Genuine Russia, according to assortment.....	\$ 12 @14½¢
Patent Planished, W. Dorees Wood.....	\$ 10¢; B, 9¢ net
<b>Galvanized.</b>	

Nos. 14 to 16.....	\$ 3.20¢
Nos. 22 to 24.....	\$ 3.55¢
No. 26.....	\$ 3.75¢
No. 28.....	\$ 4.10¢
No. 20 and lighter 36 inches wide, 25¢ higher.	

## Genuine Iron Sheets— Galvanized.

Nos. 22 and 24.....	\$ 5.25¢
No. 26.....	\$ 6.25¢
No. 28.....	\$ 7.25¢

## Corrugated Roofing—

2½ in. corrugated.....	Painted	Galvd.
No. 24.....	\$ 100 sq. ft. \$3.25	4.50
No. 26.....	\$ 100 sq. ft. 2.95	4.00
No. 28.....	\$ 100 sq. ft. 2.80	3.75

## Tin Plates—

### American Charcoal Plates (per box.)

"A.A.A." Charcoal.....	\$6.35
IC, 14 x 20.....	7.60
IX, 14 x 20.....	7.60

<b>A. Charcoal:</b>	
IC, 14 x 20.....	\$5.40
IX, 14 x 20.....	6.50

### American Coke Plates—Bessemer—

IC, 14 x 20.....	\$4.40
IX, 14 x 20.....	5.40

### American Terne Plates—

IC, 20 x 28 with an 8 lb. coating.....	\$8.50
IX, 20 x 28 with an 8 lb. coating.....	10.50

### Seamless Brass Tubes—

List November 13, 1908.....	Base price 18¢
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### Brass Tubes, Iron Pipe Sizes—

List November 13, 1908.....	Base price 18¢
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### Copper Tubes—

List November 13, 1908.....	Base price 22¢
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### Brazed Brass Tubes—

List August 1, 1908.....	19½¢ per lb
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### High Brass Rods—

List August 1, 1908.....	14½¢ per lb
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### Roll and Sheet Brass—

List August 1, 1908.....	14½¢ per lb
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### Brass Wire—

List August 1, 1908.....	14½¢ per lb
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### Copper Wire—

Base Price.....	Carload lots mtl 14½¢
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### Copper Sheets—

Sheet Copper Hot Rolled, 16 oz (quantity lots).....	\$ 18 ¢
Sheet Copper Cold Rolled, 1¢ advance over Hot Rolled.....	
Sheet Copper Polished 20 in. wide and under, 1¢ square foot.....	
Sheet Copper Polished over 20 in. wide, 2¢ square foot.....	
Planished Copper, 1¢ square foot more than Polished.....	

## METALS— Tin—

Strait's Pig.....	\$ 34¢@35¢
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## Copper—

Lake Ingot.....	\$ 14½¢@15 ¢
Electrolytic.....	\$ 14½¢@15 ¢
Casting.....	\$ 14½¢@14½¢

## Spelter—

Western.....	\$ 6¼¢@6½¢
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## Zinc.

No 9, base, casks.....	\$ 8 ¢   Open..... \$ 8¼¢
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## Lead.

American Pig.....	\$ 5 ¢@5¼¢
Bar.....	\$ 6¼¢@6½¢

## Solder.

½ & ¾, guaranteed.....	\$ 22¼¢@23¼¢
No. 1.....	\$ 18¼¢@19¼¢

Refined..... \$ 12¼¢@17¼¢  
Prices of Solder indicated by private brand vary according to composition.

## Antimony—

Cookson.....	\$ 10¢
Halletts.....	\$ 10¢
Other Brands.....	\$ 9½¢

## Bismuth—

Per lb.....	\$ 2.00@2.25
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## Aluminum—

No. 1 Aluminum (guaranteed over 99% pure), in ingot for remelting.....	\$ 34¢
Rods & Wire.....	Base Price 31¢
Sheets.....	Base Price 33¢

## Old Metals.

Dealers' Purchasing Prices Paid in New York

<b>Cents—</b>	
Copper, Heavy cut and crucible.....	\$ 10.75@11.00
Copper, Heavy and Wire.....	\$ 10.50@10.75
Copper, Light and Bottoms.....	\$ 9.50@9.75
Brass, Heavy.....	\$ 7.00@7.50
Brass, Light.....	\$ 5.70@6.00
Heavy Machine Composition.....	\$ 9.75@10.00
Clean Brass Turnings.....	\$ 7.00@7.25
Composition Turnings.....	\$ 8.00@8.25
Lead, Heavy.....	\$ 3.50
Lead, Tea.....	\$ 3.25
Zinc Scrap.....	\$ 3.75



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